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KENSINGTON GOLD PROJECT

FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

VOLUME II

Cooperating
Agencies

EPA

Kensington Gold Project
Final Supplemental
Environmental Impact Statement

VOLUME II

United States Department of Agriculture
Forest Service
Tongass National Forest

August 1997

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APPENDIX A

RESPONSES TO PUBLIC REVIEW COMMENTS

A. RESPONSES TO PUBLIC REVIEW COMMENTS

The U.S. Environmental Protection Agency published in the Federal Register on February 14, 1997, a Notice of Availability for the Kensington Gold Project Draft Supplemental Environmental Impact Statement. The 45-day public review and comment period closed on April 7, 1997. Table A-1 presents a complete listing of the timely comments received from the public and Federal, State, and local organizations.

This appendix provides specific responses to the comments received from the parties listed in Table A-1. Copies of the comment letters are presented on the following pages. The relevant comments are marked and numbered for identification, along with the Forest Service response to each comment. Where changes in the text were appropriate, such changes are noted.

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Alaska State Legislature

House Of Representatives

REPRESENTATIVE
PETER KELLY
Mailing Address:
119 N. Cushman, Suite 203
Fairbanks, Alaska 99701
(907) 456-8161

While in Juneau
State Capitol
Juneau, Alaska
99801-1182
(907) 465-2327

House District 31

Mr. Roger Birk
EIS Team Leader, Region 10
Tongass National Forest
8465 Old Dairy Road
Juneau, Alaska 99801

Reference 2-900592
Lynn Canal 31

Dear Mr. Birk:

I have reviewed the application and public notice distributed by the US. Army Corps of Engineers for Coeur Alaska's proposed construction of the Kensington Gold Mine. I find the project to be in the best interests of the citizens and the State of Alaska. 1-1

Please complete the EIS and issue the necessary permits in the most expeditious manner possible.

Sincerely Yours,

Representative Pete Kelly

RECEIVED
FEB 2 6 199
Juneau Ranger District

RESPONSES TO COMMENTS
Commentor No. 1: Representative Pete Kelly, Alaska State Legislature

Response to Comment 1-1

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

Smith Bayliss LeResche Inc Environmental Consultants and Engineers
Richard Smith P.E. (907) 747-5775 119 Seward Street #10
Randolph Bayliss P.E. (907) 586-6813 Juneau Alaska 99801
Robert LeResche PhD (907) 586-8338 fax (907) 586-6819

Roger Birk
EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, AK 99801

Kensington Draft Supplemental EIS

Some of the water quality information reflects a lack of intelligence about chemistry and mathematics and some sloppy work.

In Table F-3, Station SH-4 shows a max of 2,890,000 mg/l of iron. Not possible. That's greater than 100% unless you're claiming a specific gravity of 2.89+ for water. 2-1

Then look at Table F-4: you show a mean for turbidity of 780 NTU and a standard deviation of 1,418. You have just told me that 16% of the turbidity values are less than -638 NTU. Since turbidity can not assume a negative value, this shows that you do not have a normal distribution. Another hint is that the median (70) is nowhere near the mean. Normal distributions do not apply to TSS, sulfates, phosphates, and hydroxides (of what?) in the table. Thus, the notion of using arithmetic means to measure central tendency for these kinds of data is brainless. 2-2

Table F-4 contains typos in the column mislabeled "elements" and is unclear about units of measure for alkalinity, acidity, and hardness (mg/l as $CaCO_3$?). 2-3

You can not average pH values. pH is a logarithmic index so a pH of 6.0 and a pH of 8.0 should "average" to 6.3 using the arithmetic mean of the antilogs. Even if you did the proper math, any mean would be meaningless because you would be ignoring the effects of alkalinity. A pH of 6.0 with alkalinity of 25 ppm would have a different weight than a pH of 6.0 with 250 ppm alkalinity. 2-4

Other questions come up. The sum of Ca, Na, K, Cl, HCO_3, and SO_4 exceeds the TDS. Anions do not match cations. Bicarbonates of 598 mg/l do not jive with an alkalinity of 490 mg/l. 2-5

Speaking of which, the definition of alkalinity in the glossary is dead wrong. 2-6

On page F-7, you urge readers to "exercise caution" when comparing statistical data. Taking it one step further, since EIS writers do not grasp the simple basics of chemistry and math, even more caution is needed for the more complex advanced science. Clearly, robotic number crunching in EIS-by-the-pound shows a failure of intelligence, artificial and otherwise. 2-7

Randolph Bayliss

Smith Bayliss LeResche Inc by
Randolph Bayliss, P.E., Environmental Engineer,
Managing Principal
27 February 1997

RESPONSES TO COMMENTS
Commentor No. 2: Smith Bayliss LeResche, Inc., Randolph Bayliss, P.E.

Response to Comment 2-1

Iron concentrations in Table F-3 in the Draft Supplemental Environmental Impact Statement (SEIS) (Table G-3 in the Final SEIS) were labeled incorrectly. The units have been changed to micrograms per liter (µg/L) in the Final SEIS.

Response to Comment 2-2

The *Kensington Mine Project, Water Quality Monitoring Program, Data Summary and Analysis* (Montgomery Watson, 1996a) presents a complete summary of raw data and an analysis of baseline conditions. This document is included in the SEIS Planning Record. Table F-4 of the Draft SEIS (Table G-4 of the Final SEIS) was developed to summarize the large amount of baseline ground water quality data for the dry tailings facility (DTF) Terrace Area presented in this report. Standard deviations are presented, along with means and median values, to facilitate association of the sample variance and the summarized data values. As the commentor noted, a large standard deviation associated with a mean indicates that the population is highly variable or that other covariants affect the normality of the distribution. Means with high standard deviations should be suspect when being used to make statistical comparisons using normal parametric methods. The turbidity example, provided by the commentor, exemplifies this case. Statistical comparisons of the baseline ground water quality data included in Table G-4 were not necessary, however, and were not conducted as a part of the National Environmental Policy Act (NEPA) analysis. If statistical analyses of these data were required, effects of covariates would have been considered in the analysis or non-parameteric methods would have been employed.

Response to Comment 2-3

Typographical errors have been corrected in Table G-4 of the Final SEIS (Table F-4 of the Draft SEIS). Copies of Montgomery Labs' analytical reports indicate that hardness is given in units of mg/L as $CaCO_3$ equivalent. A footnote to the table has been added to this effect.

Response to Comment 2-4

The mean and standard deviation values for pH have been removed from Tables 3-8, E-6, F-3, G-3, and G-4 of the Final SEIS (Table 3-8, D-6, E-3, F-3, and F-4 of the Draft SEIS, respectively).

Response to Comment 2-5

Constituent concentrations reported in the Draft SEIS accurately reflect the results of analyses provided by the operator. The analyses were conducted in accordance with EPA procedures prescribed in 40 CFR Part 136.

As noted by the commentor, the sum of mean values for Ca, Na, K, Cl, HCO_3, and SO_4 exceeds the mean value of total dissolved solids (TDS) in Table F-4 of the Draft SEIS. When the large

standard deviations associated with the means are considered, the mean sum and mean TDS values are not found to be significantly different (mean sum =306.5±209.4; mean TDS=229±79). Nevertheless, the sum of Ca, Na, K, Cl, HCO_3, and SO_4 typically exceeds measured TDS for many individual samples. Several factors may contribute to this discrepancy: 1) Ca and K are measured as total cationic constituents and may include these cations in suspended form, 2) total suspended solids have a median value of 110 mg/L, with 6 of 17 samples having total suspended solids (TSS) exceeding 1,000 mg/L, and 3) HCO_3 values are calculated using EPA method 310.1.

The commentor also noted correctly that anion sums do not match cation sums. The mean cation sum reported in Table F-4 of the Final SEIS exceeds the mean anion sum (4.74±2.45 versus 4.0±2.3). Discrepancies in these values were noted by Montgomery Labs (Lab Report 27479, Group Validation Comments included as part of Attachment 6, Addendum 6, to the National Pollutant Discharge Elimination System (NPDES) permit [SRK, 1996d]) and attributed to the high suspended solids content of many samples. Cation analyses were conducted on samples preserved with nitric acid, which may have brought additional constituents into solution. In contrast, anion analyses were conducted on unpreserved sample splits.

The commentor correctly notes that the mean value for bicarbonate exceeds the mean value for alkalinity in Table F-4 of the Final SEIS. The data reported in Table F-4 were summarized from the Montgomery Watson lab reports provided as Attachment 6, Addendum 6, to the NPDES permit application (SRK, 1996d). These reports show that bicarbonate values exceed measured alkalinity in several samples. The lab reports also indicate that bicarbonate values are calculated and could be the source of the discrepancy.

Response to Comment 2-6

The definition of alkalinity has been modified in the glossary of the Final SEIS.

Response to Comment 2-7

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

Tongass National Forest

WRITTEN COMMENT SHEET

Public Meeting Location: Juneau Ak

Thank you for participating in the public involvement process for the Kensington Gold Project Draft Supplemental Environmental Impact Statement. Your comments are important to us.

Date: 3-25-97

I support Alternative B.
I do not and cannot support Alternative ~~D~~ As to the need for a Berm surrounding the Dry Tailings Facility. The chance of an event that could saturate the Tailings followed by an earth-quake or two of the magnatude needed ~~to~~ to liquify the tailings are impossible to Fatham.
If it did occur that Tailing pile would be the least of our problems. Probably all Builtings in the Valley would ~~be~~ be destroyed.
Let's issue the permits and make the applicant meet the requirements of our abundant laws

— 3-1

*** Please Print ***

Name: Jim Wilson

Address: 2355 KA See An Dr — Juneau, Ak 99801
Street Address — City/State/Zip Code

Please hand in this form or mail by April 7, 1997.
If you have questions, please call Roger Birk, Juneau Ranger District, at 586-8800.

U.S. Army Corps of Engineers

RESPONSES TO COMMENTS
Commentor No. 3: Jim Wilson

Response to Comment 3-1

Section 4.2 of the Final SEIS indicates that the DTF could become saturated, although the risk of saturation is difficult to quantify. Because the potential exists, monitoring would be required under all alternatives. Monitoring for saturation during operations would be designed to provide information regarding pile performance and resistance to saturation over the long term. It should be recognized that some degree of error exists in measuring saturation throughout the pile. Detecting areas of developing saturation could take time during monitoring. The risk that saturated zones could lead to failure during operations, however, is very small. If saturation were detected, there would be time to construct a berm and stabilize the DTF. The risk during operations, therefore, has more potential impact on mining operations than on environmental safety. Professional judgment suggests that information and experience are not sufficient at present to guarantee that the pile would be stable at closure. Reassessment would be required on the basis of actual operating experience and the monitoring results.

Under Alternative D, a berm is required until the operator could demonstrate that the facility had enough redundancy and flexibility to remain unsaturated, given the variability in construction expected over the life of the mine. Analysis indicates that the DTF would remain unsaturated; however, this conclusion needs to be demonstrated because this would be the first such facility in this type of climate with this specific type of tailings.

March 22, 1997

Roger Birk
EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, AK 99801

Dear Sir:

Below are my comments on the proposed Kensington Mine Project. Traveling throughout the Lower 48 U.S. States, it is often easy to see how without sound, clear, and concise regulations, many environmentally toxic acts of pollution or accidents can happen. The State of Alaska is full of wonderous resources such as fishing, forests, minerals, and tourism that represent a wealth of income to our state as well as to the people who live here. It is up to the regulatory agencies to allow permitting their use, but in doing so these resources, to the utmost, must be permitted so that the least amount of pollution is attained in the process. Therefore, with the above request in mind I demand the the U.S. government agencies:

1. Remove any language in the permitting process which states that treatment technologies must be economically feasible for the applicant. It should not be a matter of personal economics as to what kind of technology the polluter uses. We must require that the most effective treatment be used or else not allow the discharge into public waters. 4-1

2. I do not want the allowable levels of toxins discharged into our waters to be lowered when issues concerning mixing zones are considered. The regulations for any discharge into marine waters must meet water quality standards. Those standards should not be changed to meet economic needs. 4-2

3. Certain areas should be off limits to mixing zones. Those areas should include critical fishing grounds, refuges, reserves, parks, and wilderness areas. Sherman Creek is a highly used area of the fishing fleet in Lynn Canal. The surrounding waters are rich in salmon and I do not want to see a mixing zone allowed that would threaten this fishery. It needs to be set in writing that this area is given the utmost protection by our government so that the seafood eaten from this area is not tainted in toxins. I demand that we use the "most conservative appproach" for this mixing zone when determining the human health cancer risk analysis. If we eat seafood from an area where there is a mixing zone, the human health risk needs to be addressed. 4-3

4. It is possible to know, by testing, exactly what pollutants are being put into a mixing zone. I demand, as a woman, that toxins that impair reproduction, fetal development, and immune systems are not to be allowed into our mixing zones. We must be fully protected even if the chemicals being used are non-cancer causing. Again, we must be extremely 4-4

RESPONSES TO COMMENTS
Commentor No. 4: Joyce Levine

Response to Comment 4-1

As discussed in Sections 2.3.5 and 4.4.2 of the Final SEIS, the proposed treatment measures are the most effective in ensuring compliance with applicable water quality standards for toxic pollutants. Decisions related to necessary treatment to meet watcr quality are not economically based.

Response to Comment 4-2

The selected alternative in the Forest Servicc Record of Decision does not include a marine discharge or mixing zone for process water discharges. Because the U.S. Environmental Protection Agency (EPA) would have jurisdiction over the permitted discharge, the EPA preferred alternative will be identified in the EPA Record of Dccision. Under the NPDES permitting process, the State has granted a mixing zone for the sanitary discharge at outfall 003. Such mixing zones are allowable under State water quality standards. As discussed in the Final SEIS, this sanitary discharge would not adversely affect aquatic life. EPA and the Alaska Department of Environmental Conservation (ADEC) would select the final location for the sanitary dischargc.

Response to Comment 4-3

Please see the response to Comment 4-2.

Response to Comment 4-4

The selected alternative in the Forest Service Record of Decision does not include a mixing zone for process water discharges. The applicable water quality standards provide for protection of human health and the environment. Standards are also developed to protect against mutagenic and teratagenic effects. Please scc the response to Comment 4-2.

careful with ANY toxins that we put into our marine waters. It is very frightening to think that the government is considering changing the acceptable levels of contaminants into Sherman Creek. I do not want to lower the water standards for the discharge into Sherman Creek. I demand instead that the goverment require the Kensington Mine Projcct to improve the water quality of the discharge. I realize that it would be more economically feasible for the Kensington Mine Project if the Water Quality Standards, 18 AAC 70, were authorized to increase the levels of Total Dissolved Solids into Sherman Creek. I demand that the water quality protection for the fisheries in that area be given a higher value than the economic feasiblilty for the mine project. Higher levels of discharge mine drainage and industrial wastewater from minerals development at the mine threaten the salmon and other seafood in that area. I demand that you protect those areas instead of allowing them to be threatened. 4-5

5. Presently the Kensington Mine Project has stated that they are planning to ship the ore somewhere else to be processed. Before the project begins, I would like to know where they are planning on shipping the ore to be processed and what means of processing they plan to use to extract the gold. Even if the company is not going to do the processing here, I demand to know where they will do the processing and how they are going to do it. 4-6

I demand that the highest levels of protection be given to the fisheries in the State of Alaska. I demand that you not allow the protection of the fisheries to be lowered because of economic feasiblilty. These waters are ours and also belong to future generations. The U.S. Government made enough mistakes in the Lower 48 with allowable discharges into waters that are now polluted to the point of fish stocks severely diminished. I want the fish stocks in Alaska to stay strong and plentiful. I demand that you protect our waters and not give in to big economic money interests. Your interest must be in the protection of the environment and not the economics. 4-7

Please keep me informed of any further information related to the Kensington Mine Project. I look forward to hearing from you. Thank you very much

Sincerely yours,

Joyce Levine

Joyce Levine
P.O. Box 1705
Juneau, AK 99802

Response to Comment 4-5

The State has established TDS site-specific criteria for Sherman and Camp Creeks. Since the State of Alaska is the authority responsible for establishing site-specific criteria, variances, and mixing zones, any such changes are beyond the authority of NEPA. If adopted, these criteria would be incorporated into the NPDES permit and Section 401 certification. The Final SEIS analysis was conducted based on the projected concentrations of TDS (and other effluent constituents) rather than applicable standards. As discussed in Section 4.4.2 of the Final SEIS, the benign nature of TDS in the effluent and the current monitoring and toxicity test work indicate that TDS in the discharges would not adversely impact aquatic life.

Response to Comment 4-6

Ore would be processed at an offsite facility under Alternatives B through D, as discussed in Section 2.3.4 of the Final SEIS. At present, the operator has not selected a facility to process the ore concentrate. The facility selected to receive and process the ore concentrate would need to be permitted under applicable regulatory programs.

Response to Comment 4-7

The proposed process water discharges would meet all applicable water quality standards for protection of aquatic life. The Final SEIS documents projected impacts on fresh water and marine fisheries. Please see the response to Comment 4-1 related to economics.

March 23, 1997

Roger Birk, EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, AK 99801

Dear Mr. Birk:

I would like to add the comments below to those I have already submitted to you. I have many concerns with the Kensington Supplemental Draft Environmental Impact Statement that I would like to see addressed in the permitting process.

1. The Forest Service needs to include in its selected alternative the protective structural berm around the 113 acre dry tailings pile and any tailings pipeline. The plan needs to address how valuable fish habitat in Lynn Canal will be protected from slope failures and spills from the dry tailings pile. 5-1

2. The Forest Sevice plan and the Corp of Engineers permit needs to describe the rationale for and the effects of the exceptionally long underground pipes for upper Sherman Creek(one 380 ft and the other 300 ft) and Ivanhoe Creek(200ft) and the long, open ditch to divert Ophir Creek around the mine site. 5-2

3. The Forest Service needs to describe and evaluate the monitoring requirements for the Plan of Operations. Without such a discussion with the public, neither the Forest Service nor the public can properly evaluate the severity of adverse effects from the project. 5-3

4. The Forest Service needs to disclose and evaluate the possible effects of discharged mine drainage water on the migrating salmon and other marine life. In addition, the Forest Service needs to better describe the potential economic impacts of the project, including the possible losses from real or perceived contamination of seafood products in Lynn Canal. 5-4

5. The Forest Service needs to ensure that the amount of tailings returned to the mine approaches 50% rather than the 25% minimum described, and that return of tailings to the mine begins at the outset of operations to minimize problems associated with a dry tailings pile. 5-5

6. The Forest Service needs to describe and evaluate more fully the cumulative impacts from all past, present, and reasonably forseeable future actions in the rich and productive Berners Bay watershed. These actions include the Jualin Mine, the proposed Lace River Hydroelectric Project, the proposed Juneau Access Road, and the Goldbelt Native Corporation's proposal for a new community and ferry terminal in Echo Cove. 5-6

RESPONSES TO COMMENTS
Commentor No. 5: Joyce Levine

Response to Comment 5-1

Please see the response to Comment 3-1. The recommendation to place a berm around the initial cell is based on current technical evaluations of possible site conditions. Further studies and evaluation of actual operating "as-built" conditions could show that the pile would desaturate safely and remain stable over the long term. If this occurred, berm construction could be discontinued. The purpose of the berm is to prevent slope failures.

Response to Comment 5-2

Under Alternatives B and C, road crossings on upper Sherman Creek and Ivanhoe Creek would be constructed using long-span, low-arch bottomless conduits to route creek flows, rather than using standard road culverts or "underground pipes." The conduits would be approximately 30 feet wide. Because they are bottomless, the conduits would be placed over the natural streambed and flood plain to maintain channel conditions and to minimize impacts to aquatic habitat. At each specific location, the length of conduit required for each crossing would depend on the width of the haul road, the amount of fill required above the conduit, and the length of the sloped fill at the road edge. The 380-foot conduit proposed for upper Sherman Creek, as described in the Draft SEIS, was originally designed to protect the channel and the flood plain from potential erosion, which would occur from the process area bench. In an effort to further minimize impacts, the operator refined the conceptual design of this conduit on upper Sherman Creek, reducing its length to 180 feet. This reduction was accomplished by proposing to build a retaining wall below the foundation bench to control erosion and protect the flood plain. The proposed length of the other conduit on upper Sherman Creek has not been changed. Based on further evaluation of existing topography, the operator has proposed that the maximum length of conduit required for the crossing on Ivanhoe Creek be 180 feet. Section 2.3.5 of the Final SEIS reflects these changes. Section 7.2 of the *Technical Resource Document for Water Resources* (SAIC, 1997a) provides detailed descriptions of these crossings, and the *Kensington Gold Project, Addendum to the Report on Construction Activity Related to Creek Crossings and Alterations* (SRK, 1997c) presents conceptual engineering drawings. These documents are included in the SEIS Planning Record.

The Forest Service has incorporated the use of bridges for these crossings under Alternative D in the Final SEIS. Sections 2.2.4 and 2.3.5 of the Final SEIS reflect these changes. Sections 4.3.2 and 4.3.5 of the Final SEIS discuss and compare the potential impacts associated with both conduits and bridges.

The Ophir Creek diversion channel, proposed under Alternatives B through D, is required to route stream flows around the proposed process facilities. Sections 4.3.2 and 4.7.2 of the Final SEIS describe potential impacts that could occur as a result of this diversion. The channel would be restored after completion of mining operations. Appendix C of the Final SEIS describes channel restoration. Section 7.1 of the *Technical Resource Document for Water Resources* (SAIC, 1997a) provides detailed descriptions of the preliminary design of the diversion. This document is included in the SEIS Planning Record.

The Corps of Engineers Section 404 permit would reflect these designs.

Response to Comment 5-3

Monitoring would be conducted under a number of the permits required for the mine to operate. Section 2.5.2 of the Final SEIS presents the conceptual framework for monitoring. The monitoring plan associated with the Plan of Operations would be finalized and approved with that document. In addition, the NPDES permit would require monitoring. Monitoring requirements were included in the draft permit, which was available to the public at the same time the Draft SEIS was released. The State permits (e.g., air quality, solid waste) would also establish monitoring requirements.

Response to Comment 5-4

Section 4.6.4 of the Final SEIS has been revised to discuss the possible effects of the discharge of treated mine water on salmon migration. Based on information from Section 4.6.4, the selected alternative in the Forest Service Record of Decision includes an average discharge from the mine drainage treatment system of approximately 2.2 cfs (1,000 gpm) during the salmon migration period (June through September). During this period, the flow from Sherman Creek into Lynn Canal averages 35.6 cfs (Table 3-4 of the Final SEIS) without any dilution, which would frequently be provided by process area runoff. The discharge from the outfall, therefore, would only be 6 percent of the Sherman Creek flow into Lynn Canal during the migration period. Because of the low discharge rate relative to Sherman Creek, the discharge is unlikely to affect salmon migrations.

Risk perception studies involving hazardous materials release events suggest that the market could be affected by the perception of harm, as well as from actual harm, to resources or commodities. Usually, this is the result of societal fears about a product as information about an event is transmitted through the media. Although impacts to a commercial fishery from perceived risk associated with environmental contamination could occur, it is not possible (given the available data) to quantify the probability or the effect.

Response to Comment 5-5

The development of a mine changes and is continually being optimized during operations to reflect an increasing knowledge of ore distribution, as well as of the practical mining aspects associated with developing the deposit. Maximizing the amount of backfill is better environmentally; however, some flexibility in the mine plan is required. For example, it might not always be safe or practical to backfill some of the mine workings. The operator has committed to backfilling 25 percent of the tailings as the base case and to use a higher percentage of backfill if possible as part of ongoing mine development and planning.

Response to Comment 5-6

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

7. It is also of great concern to me as to where and how the tailings from the mine are going to be processed. Is a cyanide process going to be used? Where are they going to process the ore? Although this possibly doesn't concern Juneau, I would like to know where and how the processing is going to be done. 5-7

There have been many positive changes to the original plans for the Kensington Mine Project that I am pleased about. However, my comments listed in this letter are important concerns I have that must be addressed by the Forest Service. Berner's Bay is an area of great recreational, fisheries, and wildlife use as well as having incredible wildland value. I do not want to see economic interests destroy this area and demand that the Forest Service, if giving a permit to the mine, also demand the utmost protection to the area.

Sincerely yours,

Joyce Levine

Joyce Levine
P.O. Box 1705
Juneau, AK 99802

cc: Ms. Gretchen Keiser, CBJ Mine Project Coordinator

Response to Comment 5-7

Please see the response to Comment 4-6.

BOB ROBINSON
4424 TEEL COURT
JUNEAU, ALASKA 99801

Roger Birk
EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, Alaska 99801

March 23, 1997

Dear Mr. Birk:

I have read the Draft SEIS prepared for the Kensington project and after doing so I believe the Forest Service should be able to encourage development of project Alternative B. The substantial modifications made to the 1992 design of the project result in a reasonably small risk of significant environmental degradation.

Regulatory standards need to be designed to both encourage investment in resource development and to protect the environment from significant harm. Environmental standards that are overly restrictive are detrimental to families attempting to earn a living in Alaska. It is crucial that the risk of harm to the environment resulting from resource development be balanced with the economic benefits to Alaska wage-earners. The environment can often absorb the influence of economic activity, with the constraints of modern regulation, without suffering significant degradation. 6-1

It cannot be overemphasized how valuable living-wage,. year-round job opportunities are to families in our community. Development of the Kensington will benefit many local wage-earners. Workers in resource industries have sustained too much economic damage from the withdrawal of vast amounts of land from multiple use and other regulatory decisions.

In evaluating the Kensington project the lead agency must consider the value of hundreds of good jobs for the Southeast community. It will never be possible to have unanimous approval of a large project such as the Kensington. The Forest Service should be able to agree with and support project standards that will encourage investment in the Kensington as well as protect the local environment from significant degradation. 6-2

RESPONSES TO COMMENTS
Commentor No. 6: Bob Robinson

Response to Comment 6-1

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

Response to Comment 6-2

Section 4.11.2 of the Final SEIS has been modified to discuss the operator's commitment to hiring within Southeast Alaska.

Another important issue is that the permitting process be completed in a timely, businesslike manner. The lead agency has the responsibility of preventing the permitting process from becoming bogged down in unreasonable bureaucratic complications. 6-3

I appreciate your consideration.

Sincerely,

Bob Robinson

Bob Robinson

Response to Comment 6-3

Thank you for your comment.

24 March 97

Please be thorough + conservative in your DEIS for Coeur's Kensington Mine. I recreate in Berners Bay and want to see it remain pristine. I think this project is an example for others to follow - Be conservatively safe! - we've polluted enough water + earth in this world already. Thanks!

Deb Lessmeier Juneau

7-1

RESPONSES TO COMMENTS
Commentor No. 7: Deb Lessmeier

Response to Comment 7-1

The project is not anticipated to have either direct or indirect impacts on Berners Bay. Under the selected alternative in the Forest Service Record of Decision, all discharges would comply with water quality standards. The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes all of the cumulative impacts associated with the Kensington Gold Project.

Tongass National Forest

WRITTEN COMMENT SHEET

91

Public Meeting Location: Juneau

Thank you for participating in the public involvement process for the Kensington Gold Project Draft Supplemental Environmental Impact Statement. Your comments are important to us.

Date: 3-25-97

At this time, I would like to go on record as strongly supporting the Kensington Mine Project. Coeur Alaska has been more than responsive to environmental, community + regulatory needs. They have addressed and continue to fine tune all concerns raised by previous studies + have brought this particular mine project to a very workable situation. 8-1

Concerns being raised in particular about cumulative effects, I feel, are being over exaggerated + Coeur is being asked to be held responsible for projects not in their domain. It is my 8-2

*** Please Print ***

Name: Linda Hay

Address: PO Box 20966 (Street Address) Juneau AK 99802 (City/State/Zip Code)

Please hand in this form or mail by April 7, 1997.
If you have questions, please call Roger Birk, Juneau Ranger District, at 586-8800.

U.S. Army Corps of Engineers

RESPONSES TO COMMENTS
Commentor No. 8: Linda Hay

Response to Comment 8-1

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

Response to Comment 8-2

NEPA requires consideration of cumulative effects as part of the environmental impact statement. The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

pg2

opinion that each project - The Jualin Mine - the proposed road - Goldbelt's development of Echo Cove + the proposed hydroelectric facility will each need to face their own EIS + their own set of permits + hearings. — 8-2 (cont.)

I feel that the various agencies involved should work together - utilize the new updated studies + continue on the timetable as planned to bring the Kensington into production. The issues have been addressed and do not continuous "second guessing". — 8-3

Thank You for your attention to this matter.

Linda Hay
Juneau AK

Response to Comment 8-3

Thank you for your comment.

Roger Birk
EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, Alaska 99801

March 26, 1997

Dear Roger:

It is not readily apparent to me why Alternate D for Fuel Use & Storage favors diesel over liquid propane. It seems to me that LP is a lot safer environmentally, both as to air quality and potential spills. This is shown on page 2-42 of the DSEIS for the Kensington gold project. It seems that environmentally we would be better off if the project used LP to the greatest extent possible. 9-1

You are on the right track by trying to prevent discharge to Lynn canal to the greatest extent possible. Such discharges are hard to monitor and are ripe for abuse. I grew up near the Ohio river and have heard horror stories about midnight dumping of pollutants threw these pipelines. Of course nobody is ever identified as the culprit. 9-2

I am against any gold mine on the Lynn Canal because neither the economic benefit or environmental risk justifies it. Also, we do not really need more gold. However, this looks like a go so I hope you make the best of it for the environment. We will have to live with mistakes for a long time. 9-3

Sincerely yours,

Robert J. Smith
22301 Camille Drive
Woodhaven, Mi 48183

P.S. - We won one in Juneau. Maybe if the price of gold continues to decrease Kensington will become a non-reality.

RESPONSES TO COMMENTS
Commentor No. 9: Robert J. Smith

Response to Comment 9-1

Both liquefied petroleum gas (LPG) and diesel fuel are feasible alternatives for the project. Section 2.3.8 of the Final SEIS has been modified to include additional information to facilitate comparison of the effects of the use of diesel fuel and LPG for power generation. This includes the risks of spill events and levels of air emissions, as well as specific mitigation resources, for each alternative. When the Kensington Gold Project was a joint venture between Echo Bay and Coeur Alaska, LPG was considered as a fuel source for both the Kensington Gold Project and Alaska-Juneau (A-J) Project. When Coeur Alaska became the sole owner of the Kensington Gold Project and the A-J Project ended, the unit costs of using LPG solely for the Kensington Gold Project became higher than diesel fuel (as much as 7 percent). The Forest Service Record of Decision provides additional rationale for selecting diesel fuel as part of the selected alternative.

Response to Comment 9-2

All discharges, whether fresh water or marine, would be subject to water quality-based effluent limits included in the NPDES permit. These limits are based on ensuring compliance with State water quality standards for protection of aquatic life and human health. The permit would require compliance monitoring and reporting on a regular basis.

Response to Comment 9-3

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

Tongass National Forest

WRITTEN COMMENT SHEET

Public Meeting Location: HAINES, AK

Thank you for participating in the public involvement process for the Kensington Gold Project Draft Supplemental Environmental Impact Statement. Your comments are important to us.

Date: 3-26-97

I AGREE with what I have read & heard ABOUT the KENSINGTON Gold PROJECT. I APPLAUD you FOLKS FOR YOUR SCRUTINY ON THIS PROJECT. WE NEED to develop OUR NATURAL RESOURCES. I HAVE LIVED IN South EAST ALASKA for 46 years. WE ARE doing A much better JOB ON MANAGING the resources. Keep up the good work & maybe my grandchildren will have JOBS. 10-1

*** Please Print ***

Name: DON E HESS

Address: 1½ mi HAYS Hwy N. (Street Address) HAINES AK 99827 (City/State/Zip Code)

Please hand in this form or mail by April 7, 1997.
If you have questions, please call Roger Birk, Juneau Ranger District, at 586-8800.

U S. Army Corps of Engineers

Response to Comment 10-1

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

Roger Birk
EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, Alaska 99801

March 26, 1997

Dear Roger:

It is not readily apparent to me why Alternate D for Fuel Use & Storage favors diesel over liquid propane. It seems to me that LP is a lot safer environmentally, both as to air quality and potential spills. This is shown on page 2-42 of the DSEIS for the Kensington gold project. It seems that environmentally we would be better off if the project used LP to the greatest extent possible. 9-1

You are on the right track by trying to prevent discharge to Lynn canal to the greatest extent possible. Such discharges are hard to monitor and are ripe for abuse. I grew up near the Ohio river and have heard horror stories about midnight dumping of pollutants threw these pipelines. Of course nobody is ever identified as the culprit. 9-2

I am against any gold mine on the Lynn Canal because neither the economic benefit or environmental risk justifies it. Also, we do not really need more gold. However, this looks like a go so I hope you make the best of it for the environment. We will have to live with mistakes for a long time. 9-3

Sincerely yours,

Robert J. Smith
22301 Camille Drive
Woodhaven, Mi 48183

P.S. - We won one in Juneau. Maybe if the price of gold continues to decrease Kensington will become a non-reality.

RESPONSES TO COMMENTS
Commentor No. 9: Robert J. Smith

Response to Comment 9-1

Both liquefied petroleum gas (LPG) and diesel fuel are feasible alternatives for the project. Section 2.3.8 of the Final SEIS has been modified to include additional information to facilitate comparison of the effects of the use of diesel fuel and LPG for power generation. This includes the risks of spill events and levels of air emissions, as well as specific mitigation resources, for each alternative. When the Kensington Gold Project was a joint venture between Echo Bay and Coeur Alaska, LPG was considered as a fuel source for both the Kensington Gold Project and Alaska-Juneau (A-J) Project. When Coeur Alaska became the sole owner of the Kensington Gold Project and the A-J Project ended, the unit costs of using LPG solely for the Kensington Gold Project became higher than diesel fuel (as much as 7 percent). The Forest Service Record of Decision provides additional rationale for selecting diesel fuel as part of the selected alternative.

Response to Comment 9-2

All discharges, whether fresh water or marine, would be subject to water quality-based effluent limits included in the NPDES permit. These limits are based on ensuring compliance with State water quality standards for protection of aquatic life and human health. The permit would require compliance monitoring and reporting on a regular basis.

Response to Comment 9-3

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

Tongass National Forest

WRITTEN COMMENT SHEET

Public Meeting Location: HAINES, AK

Thank you for participating in the public involvement process for the Kensington Gold Project Draft Supplemental Environmental Impact Statement. Your comments are important to us.

Date: 3-26-97

I AGREE with what I have read & heard ABOUT the KENSINGTON Gold PROJECT. I APPLAUD you FOLKS FOR YOUR SCRUTINY ON THIS PROJECT. WE NEED to develop OUR NATURAL RESOURCES. I HAVE LIVED IN South EAST ALASKA for 46 years. WE ARE doing A much better JOB ON MANAGING the RESOURCES. KEEP up the good work & maybe my grandchildren will have JOBS. 10-1

*** Please Print ***

Name: DON E HESS

Address: 1½ mi HNS Hwy N. (Street Address) HAINES AK 99827 (City/State/Zip Code)

Please hand in this form or mail by April 7, 1997.
If you have questions, please call Roger Birk, Juneau Ranger District, at 586-8800.

U S. Army Corps of Engineers

RESPONSES TO COMMENTS
Commentor No. 10: Don E. Hess

Response to Comment 10-1

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

March 27, 1997

Roger Birk
EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, AK 99801

Mr. Birk:

The Kensington Gold Project, by its dimension and timing, will ignite development in the Berners Bay area, a designated LUD II and Scenic & Wild River arena. It is reasonable to assume that development of increased access by ferry, road and helicopter, Goldbelt development of their property, and increased recreation use will have cumulative impacts. Development of one or more of the Jualin Mine, Lace River Hydro Project and tourism and service businesses will add to the cumulative impacts. Cumulative impacts should be addressed in the FSEIS. 11-1

A monitoring plan should be detailed in the FSEIS. It should be accepted by all permitting agencies and funded by the company. 11-2

A reclamation plan should be detailed in the FSEIS that is accepted by all permitting agencies. This plan should include such items as: 11-3

- mitigation for loss of wetlands
- termination of any site-specific exemptions from water quality standards that may have been granted 11-4
- revegetation using indigenous plants. 11-5
- mitigation for carbon dioxide emissions. 11-6

Land use patterns and demand for urban infrastructure will be changed by the development of the Kensington Gold Project. These should be carefully considered by the socioeconomic studies in the FSEIS. 11-7

Thank you for your work. Thank you for this opportunity to comment.

Sincerely,
Nancy Waterman
Nancy Waterman

RESPONSES TO COMMENTS
Commentor No. 11: Nancy Waterman

Response to Comment 11-1

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Response to Comment 11-2

Please see the response to Comment 5-3.

Response to Comment 11-3

The Reclamation Plan currently reflects the extent of wetlands mitigation proposed by the operator. The Corps of Engineers has participated in the process of identifying mitigation measures and will determine the adequacy of the proposed mitigation. This determination will be made with Corps issuance of the Section 404 permit.

Response to Comment 11-4

The State of Alaska's Water Quality Standards Regulations (18 AAC 70) do not provide for temporary site-specific criteria that end on a specific date. As noted in Section 4.4 of the Final SEIS, however, granting site-specific criteria would not affect the ability of the streams to meet designated uses.

Response to Comment 11-5

With respect to mitigation, the Reclamation Plan requires the operator to revegetate all disturbed areas of the site. DTF cells would be reclaimed concurrently. Mitigation measures discussed in Section 2.5.1 of the Final SEIS include the use of native species and require a demonstration of revegetation success through comparison to natural conditions.

Response to Comment 11-6

The Reclamation Plan would not mitigate for carbon dioxide emissions during operations; the plan requires complete site revegetation at closure.

Response to Comment 11-7

Section 4.11 of the Final SEIS addresses the potential effects on population and housing, as well as urban infrastructure, including public utilities and school capacity.

Tongass National Forest

WRITTEN COMMENT SHEET

Public Meeting Location: Haines

Thank you for participating in the public involvement process for the Kensington Gold Project Draft Supplemental Environmental Impact Statement. Your comments are important to us.

Date: 3-27-97

My major concerns with this project are:
- erosion control 12-1
- revegetation 12-2
- water turbidity monitoring 12-3
- fuel transport 12-4

Please make standards as strict as possible to make sure that our water quality is not compromised! 12-5

Thank you
[signature]

*** Please Print ***

Name: Cynthia Allen

Address: PO Box 81 (Street Address) Haines AK 99827 (City/State/Zip Code)

Please hand in this form or mail by April 7, 1997.
If you have questions, please call Roger Birk, Juneau Ranger District, at 586-8800.

U.S. Army Corps of Engineers

RESPONSES TO COMMENTS
Commentor No. 12: Cynthia Allen

Response to Comment 12-1

Sections 4.4 and 4.7 of the Final SEIS discuss practices that would be employed for each alternative to minimize and mitigate erosion and sedimentation. Sedimentation during construction and operation at the Kensington Gold Project site would be controlled primarily through best management practices (BMPs) and several large sedimentation basins to capture storm runoff from disturbed areas. Section 7 of the *Technical Resource Document for Water Resources* (SAIC, 1997a) provides a detailed discussion of the design of the sediment basins. This document is included in the SEIS Planning Record. The DTF would be reclaimed as it is constructed, and the entire site would be reclaimed at closure.

Response to Comment 12-2

Please refer to the Reclamation Plan in Appendix C of the Final SEIS and the response to Comment 11-5.

Response to Comment 12-3

The NPDES permit would require instream turbidity monitoring.

Response to Comment 12-4

The companies operating fuel barges on Lynn Canal have very good safety records. Page 4-47 of the 1992 FEIS provides data on oil pollution events in Lynn Canal from 1986 through 1990. No events were associated with fuel barge sinkings or damage during this period, and none have occurred since then, according to the U.S. Coast Guard. The fuel shipments needed to supply the Kensington Gold Project would increase current diesel fuel transport on Lynn Canal by approximately 5 percent under Alternative A and 15 percent under Alternatives B through D.

Response to Comment 12-5

All discharges, whether fresh water or marine, would be subject to effluent limits established in the NPDES permit. These limits are established to protect water quality, aquatic life, and human health. The NPDES permit would require monitoring and reporting on a regular basis. Additional monitoring would be required for State permits (e.g., solid waste, air quality).

Tongass National Forest

WRITTEN COMMENT SHEET

Public Meeting Location: ________________

Thank you for participating in the public involvement process for the Kensington Gold Project Draft Supplemental Environmental Impact Statement. Your comments are important to us.

Date: March 28, 1997

I have only lived in Haines for seven years now, but I intend to make this my home.

In the seven years that I have lived here, we have lost what little industry that we had and our community has suffered because of it. People have had to move to other locations just to make a living and that means our community loses.

We need industry here and I think that Kensington has proved that they will protect the wildlife and our environment. I would not like to see our community be exclusively dependent upon the tourist industry, so I am in total support of the Kensington Gold Project in our community.

Thank you for the opportunity to have my say in this matter.

13-1

*** Please Print ***

Name: La'Donna Blake

Address: P O Box 1376 — Haines, AK 99827

Street Address — City/State/Zip Code

Please hand in this form or mail by April 7, 1997.
If you have questions, please call Roger Birk, Juneau Ranger District, at 586-8800.

U.S. Army Corps of Engineers

RESPONSES TO COMMENTS
Commentor No. 13: La'Donna Blake

Response to Comment 13-1

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

WRITTEN COMMENT SHEET
RE: DSEIS - KENSINGTON MINE PROJECT

Thank you for participating in the public process for the Kensington Gold Project Draft Supplemental Environmental Impact Statement. Your comments are important.

Date: 3/28/97

I think that ~~the~~ Kensington Gold Project can be accomplished with minimal enviromental impact due to today's regulations, processes and procedures. I think that the socio-economic impact will be a very positive impact. I totally support Couer Alaska in its efforts. 14-1

Please Print

Name: David Carlson

Address: 9343 Betty Ct Juneau AK 99803
Street Address City/State/Zip Code

Send written comments to the U. S. Forest Service by **Monday, April 7:**

Roger Birk, EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, AK 99801

RESPONSES TO COMMENTS
Commentor No. 14: David Carlson

Response to Comment 14-1

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

Tongass National Forest

WRITTEN COMMENT SHEET

Public Meeting Location: Haines, AK

Thank you for participating in the public involvement process for the Kensington Gold Project Draft Supplemental Environmental Impact Statement. Your comments are important to us.

Date: March 28, 1997

I have lived in Haines for over 42 years and have seen many industries shut down or denied permits because of environmental stalemates and preservationists that do anything to stop industry.

I totally support the Kensington Project and feel that Core will operate in a safe environmental way.

I would like to see at least a 75% to 85% Alaska work force and training program to protect Alaskan hire! Southeast Alaska needs these jobs and this industry.

15-1

*** Please Print ***

Name: Timothy B. Ward

Address: P O Box 1609 — Haines, AK 99827

Street Address — City/State/Zip Code

Please hand in this form or mail by April 7, 1997.
If you have questions, please call Roger Birk, Juneau Ranger District, at 586-8800.

U.S. Army Corps of Engineers

RESPONSES TO COMMENTS
Commentor No. 15: Timothy B. Ward

Response to Comment 15-1

Section 4.11.2 of the Final SEIS has been modified to include additional information on employment opportunities. As indicated, there is considerable potential for hiring workers from Southeast Alaska, and efforts are being conducted to take advantage of employment opportunities.

WRITTEN COMMENT SHEET
RE: DSEIS - KENSINGTON MINE PROJECT

Thank you for participating in the public process for the Kensington Gold Project Draft Supplemental Environmental Impact Statement. Your comments are important.

Date: 3/21/97

I endorse development of the Kensington Project with the following concerns and reservations:

- The seriousness of peripheral environmental impacts must be fully appreciated & monitored such as spills of even the smallest size. 16-1
- I oppose the concept and practice of sub-marine tailing disposal 16-2
- Increased air traffic as a result of support services should have a ceiling limit 16-3
- Levels of increased small boat activity as a result of the mines development should also be capped 16-4

Please Print

Name: Roy L Carte

Address: 2391 Ka-See-An Dr. - Juneau Alaska 99801

Street Address City/State/Zip Code

Send written comments to the U. S. Forest Service by **Monday, April 7:**

Roger Birk, EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, AK 99801

RESPONSES TO COMMENTS
Commentor No. 16: Roy L. Carte

Response to Comment 16-1

The 1992 FEIS describes the potential impacts of worst-case spill scenarios. The Oil Discharge Prevention and Contingency Plan (C-Plan); Spill Prevention, Containment, and Countermeasure (SPCC) Plan; and Facility Response Plan (FRP) identify specific measures to respond to and monitor spills (See Section 1.6 of the Final SEIS).

Response to Comment 16-2

None of the proposed alternatives include submarine tailings disposal.

Response to Comment 16-3

Air traffic and air traffic control is under the jurisdiction of the Federal Aviation Administration. Chapter 4 of the 1992 FEIS provides detailed analysis of impacts associated with transportation, including helicopter traffic and helicopter noise. The Final SEIS references these analyses.

Response to Comment 16-4

Small boat traffic would presumably increase, consistent with a population increase. The mine would increase population by approximately 2 percent. This would result in an imperceivable to minimal increase in small boat activity.

Tongass National Forest

WRITTEN COMMENT SHEET

Public Meeting Location: Haines

Thank you for participating in the public involvement process for the Kensington Gold Project Draft Supplemental Environmental Impact Statement. Your comments are important to us.

Date: 3-28-97

I would like to thank you for your presentation in Haines on the Kensington Mine Project. I am a Borough Assembly member but mostly I thank you as a 12 year resident of Haines. I believe that we can have progress and protect our environment as well. I encourage you to continue your efforts to go forth with this project and Haines is a community that would like to reap the benefits of having jobs close by. 17-1

We have raised our children in Haines and we would like to see jobs that would allow them to move back "home" so we can enjoy their adult lives and spend quality time with our grandchildren.

*** Please Print ***

Name: Karen M. Hess

Address: P.O. Box 556 (Street Address) Haines, Ak. 99827 (City/State/Zip Code)

Please hand in this form or mail by April 7, 1997.
If you have questions, please call Roger Birk, Juneau Ranger District, at 586-8800.

U S Army Corps of Engineers

RESPONSES TO COMMENTS
Commentor No. 17: Karen M. Hess

Response to Comment 17-1

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

Lynn Canal Conservation, Inc.
Post Office Box 964
Haines, Alaska 99827

March 31, 1997

LCC Comments on DSEIS for Kensington Proposal

AIR QUALITY

The United States recently signed an international agreement to reduce carbon dioxide emissions in the near future, it seems contradictory to permit an operation that is powered by fossil fuels and proposes to burn 6.5 million gallons annually. The potential of the Goat Lake Hydro Project or Lace River Hydro Project should be explored. Short of that, Alternative A, using LPG, seems like a safer fuel source considering the biological sensitivity of the Pt. Sherman area. LPG would reduce emission rates and have the added benefit of reduced risk of diesel spills in Lynn Canal. According to the DSEIS, "Under Alternatives B-D, an estimated 6.5 million gallons of diesel fuel would be used annually." "Alternative A would use 2 million gallons." 18-1

GEOTECHNICAL CONSIDERATIONS

A berm placed around the DTF is essential for its long term stability given that according to the DSEIS:

1) "... there are no case histories for construction of dry tailings facilities of similar design in comparable high precipitation and seismic activity areas."

2) "Because of high precipitation conditions at the project site, portions of the pile could become saturated and not drain. This could lead to failure of the DTF slopes." 18-2

3) "Small variables in as-built conditions could result in saturation levels that would affect stability."

Coeur's preference for simply monitoring the saturation of the DTF instead of a building a berm, offers little protection from saturation and no protection from an earthquake. The FEIS indicates that "the maximum credible earthquake would have a magnitude of 6.5 to 7.0 on the Richter 18-3

RESPONSES TO COMMENTS
Commentor No. 18: Lynn Canal Conservation, Inc., Tim June

Response to Comment 18-1

The FEIS describes the proposed Lace River Hydroelectric Project. While this project could be a viable power source for the Kensington Gold Project and could reduce the need for onsite power generation and diesel use by about 50 percent, there is no assurance that the hydroelectric project will be constructed. Even if it is constructed, power probably would have to be available at the start of mining operations (i.e., it likely would not be reasonable to install onsite power generation capability and fuel storage and handling and then abandon these facilities). In addition, the Forest Service does not have the authority to require the operator to purchase hydroelectric power from Lace River Hydroelectric. A May 12, 1997, letter from Coeur d'Alene Mining Corporation to the Forest Service indicates that the operator will not pursue obtaining power from Lace River Hydroelectric.

Chapter 4 of the Final SEIS describes the potential environmental impacts associated with use of LPG and diesel fuel for power generation. The discussion concludes that the risks of spills and related environmental effects on marine and fresh water resources are low for both fuel types. In addition, Section 2.3.8 of the Final SEIS has been modified to include an expanded discussion of the reasons why LPG is no longer economically advantageous for the Kensington Gold Project. Although all air quality standards would be met, Alternatives B through D would result in higher emissions, including carbon dioxide, than would occur with LPG under Alternative A. The Forest Service Record of Decision presents the rationale for selecting diesel fuel.

Response to Comment 18-2

Please see the responses to Comments 3-1 and 5-1.

Response to Comment 18-3

The DTF is designed to minimize infiltration and enhance drainage in order to avoid saturation of the tailings. Extensive monitoring would be performed during operations, however, to detect any saturation before it could lead to liquefaction and DTF failure. An impermeable liner would not improve the stability and could increase the risk of saturation. Both the final Plan of Operations and the solid waste permit would include monitoring of saturation and drain performance. Also, please see the response to Comment 3-1.

scale." The Kensington Tailings Facility - GEOTECHNICAL Resource Report (Klohn-Crippen, 1997) states that seismic settlements could be in the order of five to ten feet and that this could lead to internal disruptions in the drain layers, interlayer barriers, and the closure cap, which could allow more infiltration and less drainage ability in the pile. It also states. "seismic deformations of 2 inches to 8 inches could lead to disruptions in the drain pipes within the interlayer developments rock drains, which could reduce their drainage capacity and lead to locally confined zones of saturated tailings." This is particularly unsettling in light of the fact that Coeur's operation plan, with its many layers of 28 foot uncompacted lifts inter tied with intricate and thin "impermeable" layers and drains, is necessarily dependent on the long term stability of the pile not only through the operations stage of the project, but eventually throughout the entire reclamation phase. This predictable instability reinforces the need for an impermeable liner underneath the DTF and a secondary containment berm surrounding the facility. Coeur defers to the Greens Creek DTF as an example of a successful DTF in a wet climate, however the Green's Creek DTF uses compaction of all lifts, which Coeur claims is too costly. 18-3 (cont.)

WATER QUALITY

The DSEIS states, "Under Alternatives B-D, fresh water discharges would meet water quality based permit limits at the discharge point. " This is predicated on Coeur being granted a site specific variance for TEDS. Recent agency reviews found serious flaws in studies submitted by Coeur for its justification. Coeur's proposed TEDS levels fail to meet drinking water standards and the "no more than one third above background" narrative. Coeur's attempt to reclassify the uses of Sherman Creek ignores the creek's existing use as DW and further fails to meet the Anti-degradation Policy of the WQS. 18-4

The arsenic criteria is also anticipated to be exceeded. SAIC consultants estimate that arsenic levels will be between 1.7-3.5 ug/l. Although the State has recently been promised removal for arsenic under the NTR, until the public process results in a Federal rule making, it is premature to anticipate what the standard may be. . 18-5

Although Coeur anticipates that Outfalls 001 and 002 will meet WQS with settling ponds and flocculation, is there a treatment option available if they 18-6

Response to Comment 18-4

Please see the response to Comment 4-5 concerning site-specific criteria for TDS. Section 4.4.2 of the Final SEIS documents that the anticipated TDS levels would not adversely affect aquatic life. This discussion includes recent results of toxicity testing performed by the operator.

Response to Comment 18-5

The Final SEIS indicates that the treated mine drainage and DTF effluent would contain arsenic levels below the method detection limit of 3 µg/L. EPA determined that compliance with the water quality standard for arsenic would be achieved by showing that arsenic levels were below this level. The Final SEIS does not consider any potential change in the State water quality standard for arsenic.

Response to Comment 18-6

The proposed mine drainage treatment system and process area settling ponds would provide the necessary treatment to meet water quality standards at outfall 001. As indicated in Section 4.4.2 of the Final SEIS, water quality standards are projected to be met at outfall 002 with the settling pond system. If higher than anticipated levels of pollutants were observed, a treatment system similar to the mine drainage system could be installed for DTF effluent.

fail to meet WQS? 18-6 (cont.)

WATER WITHDRAWLS

The in-stream flow rates of Sherman Creek are projected from other basins' data rather than actual rates measured in Sherman Creek. The DSEIS states, "A long-term data base has not been established for stream flow in Sherman Creek and its tributaries." Is projected statistical data adequate to insure the protection of aquatic life in Sherman Creek? Of particular concern are the DSEIS statements: "The withdrawals would follow instream flow requirements developed by ADF&G, which would likely prevent withdrawals during December, January, and February" and "All alternatives could require mitigation through the use of alternative ground water sources during low-flow periods, if compliance with instream flow requirements was necessary." The DSEIS offers no detailed examination of how Coeur proposes to augment the in-stream flows if necessary. 18-7

GROUND WATER HYDROLOGY AND QUALITY

The DTF should be required to have a impermeable liner beneath it to capture seepage and run-off. The DSEIS is inconsistent in describing the bedrock below the DTF. It states, "Because overlying materials typically have higher permeabilities than fractured bedrock, the bedrock contact may form a hydrologic boundary." This is not to say it "will" form a hydrological boundary. The DSEIS later admits that the bedrock is not impermeable in the DTF drainage basin, "water is lost through evapotranspiration, infiltration into ground water, and lateral subsurface flow toward Sherman Creek, Sweeny Creek, and Lynn Canal." and "...flow from these four streams (from DTF site) was not observed to outfall into Lynn Canal via surface flow. Rather, observable flow terminated at Comet Beach. The final drainage to Lynn Canal was assumed to occur through the subsurface." 18-8

The DSEIS states, "any tailings seepage that bypassed the foundation drains would not affect ground water quality because of the inert characteristics of the flotation tailings." The "inert" quality of the DTF seepage is predicated on a flawless ore sorting, grinding, and flotation process. It assumes a perfect recovery process. This is a rather broad assumption given the scale of the proposed operation and the realities of mining ore. 18-9

Response to Comment 18-7

Data from the regional hydrologic analysis presented in the *Final Report on Hydrology* (Knight Piesold, 1994) were used to provide baseline flow characterization data in the Draft SEIS. This report is included in the SEIS Planning Record. When conservatively applied, regional analyses can provide better estimates of characteristic stream flows than estimates obtained using a short-term data base, such as the one available for Sherman Creek. The FLOOD model used in the regional study provides a range of outputs for characteristic flows based on different degrees of statistical confidence. The *Final Report on Hydrology* provides ranges of characteristic flows by statistical confidence level. In order to be conservative, however, the Alaska Department of Fish and Game (ADF&G), the Alaska Department of Natural Resources (ADNR), and the Forest Service evaluated several other sources of data before establishing instream flow requirements for upper Sherman Creek. These sources included:

- U.S. Geological Survey (USGS) gauged readings on Sherman Creek (1912–1914)
- Results of a model called FLOWMOD used by the Forest Service
- Average daily flow measurements for lower Sherman Creek between 1989 and 1996
- Flow duration curves derived for each month, based on 1989 through 1996 measured data
- Fish species composition and periodicity data.

After evaluating these data sources, instream flows were determined by applying the Tennant Method to the most conservative data set for low flows, the actual measured data between 1989 and 1996. These data and periodicity data were used to derive instream flow requirements for upper Sherman Creek by applying percentages of runoff and professional judgment. These flow requirements were also considered protective for lower Sherman Creek; therefore, separate instream flows were not established for this reach. Section 3.5.3 of the Final SEIS has been revised to include monthly instream flows for upper Sherman Creek.

ADNR would issue a State permit for water withdrawals from Sherman Creek. This permit would stipulate the conditions for withdrawals and instream flow requirements that must be maintained in upper Sherman Creek to protect aquatic life. Under this permit, water could not be withdrawn on upper Sherman Creek during periods when instream flows could be compromised. The operator would not augment instream flows that are naturally below permit levels. Section 4.3.1 in the Final SEIS has been modified to clarify this concept.

Response to Comment 18-8

An impermeable liner would actually increase the risk of pile saturation. The DTF would be constructed with a low-permeability layer to reduce contact between tailings seepage and ground water. This layer would not be impermeable, however. Seepage would primarily be drained and routed to a sediment detention pond and discharged to Camp Creek. Section 4.5.2 of the Final SEIS discusses potential impacts to ground water from seepage. Results of geochemical testing indicate that acid generation from tailings and waste rock would not occur, and impacts to ground water quality are not expected. Section 6 of the *Technical Resource Document for Water Resources* (SAIC, 1997a) provides a detailed discussion of geochemical tests for tailings, waste rock, and ore. This document is included in the SEIS Planning Record.

Is the DTF runoff inert? Why not require a liner beneath the DTF to insure ground water protection? Because the technology does not exist to clean up ground water after it has been contaminated, we must make every effort to protect it from pollutants. 18-9 (cont.)

AQUATIC RESOURCES - MARINE

The DSEIS is inconsistent in projecting impacts on Lynn Canal. It claims that,
"Discharges under Alternatives B and D would not affect Lynn Canal", but later it states, "Characteristics of marine biota are important because aspects of the proposed project, including construction activities, effluent discharges, and/or accidental spills, have the potential to affect biological resources within Lynn Canal." Finally the DSEIS admits, "Any water discharged from the Kensington Gold Project site would ultimately reach Lynn Canal,..." This is inevidible and must be anticipated. Is there the possibility of an upset or accident? 18-10

AQUATIC RESOURCES - FRESH

It is disturbing to see existing elevated metals levels in Dolly Varden without a investigation of its cause. The effects from the exploratory phase of this project are small compared to the full operation phase. If there is already a tissue contamination problem, we should determine its source. The DSEIS states, "Evidence indicates that elevated metals exist in the tissues of Dolly Varden downstream from the current sediment pond outfall to the Ophir Creek tributary." 18-11

Can the USFS and ADF&G allow the degrading of fish streams? The DSEIS states, "Alternatives B through D would temporarily eliminate 2,450 feet of habitat in Ophir Creek with Fish mortality of 125 to 170 Dolly Varden." 18-12

WETLANDS

The DSEIS states, "Permanent loss of wetlands would occur at the DTF site." and
"The overall foot print of the DTF under Alternatives B and C would be about 104 acres. It would seem that to maintain the Corps responsibility of "no net loss of wetlands" there should be mitigations proposed or a fund 18-13

The description of the drainages in Section 3.5 of the Final SEIS indicates that surface flows infiltrate into the large beach cobbles rather than flow across the surface. The channels in this drainage basin do not have sufficient flows to develop specific channels across the beach cobbles to Lynn Canal. This phenomenon is not related to the permeability of the soils and sub-surface materials in the Terrace Area basin and is not related to potential impacts to ground water from tailings seepage.

Response to Comment 18-9

As documented in Section 4.5.2 of the Final SEIS, the quality of potential seepage infiltrating from the DTF to ground water is expected to be consistent with existing ground water quality. Therefore, a liner is not deemed necessary. The minerals recovery process proposed by the operator represents proven technology in ensuring a consistent level of recovery of sulfide mineralization from the ore. The tailings and waste rock leach test data compiled by the operator and used in the DTF effluent characterization provide a conservative assessment of potential releases from the DTF.

Response to Comment 18-10

The commentor cites general language in Chapter 3 of the Draft SEIS about aspects of the project potentially affecting Lynn Canal (e.g., spills, construction activities, and effluent discharges). The text in Chapter 3 is provided as baseline information for the Chapter 4 evaluation of all alternatives, including those with marine discharge of process-related water. The fresh water discharges under Alternatives B and D would eventually flow to Lynn Canal; however, Section 4.6 indicates that these discharges would not affect marine water quality or marine ecology.

The effluent technologies proposed by the operator are based on proven approaches for metals and sediment removal. With proper construction and maintenance, the potential for failure or upset is low. In addition, the Forest Service and EPA have taken a very conservative approach in projecting discharge characteristics. As a result, impacts on Lynn Canal would be unlikely, even under a failure or upset condition.

Response to Comment 18-11

The metals levels in Dolly Varden char in the Ophir Creek tributary, including the sediment pond outfall, exhibit an increase over those measured in fish from other creeks in the drainage. As discussed, existing levels are not harmful to fish or to human health through consumption of these fish. Section 3.9.4 of the Final SEIS indicates that several sources could contribute to these levels. If the source of the increase is the mine drainage discharge, Section 4.7.3 of the Final SEIS indicates that the treated discharge under the selected alternative in the Forest Service Record of Decision would have lower metals levels than the existing discharge. These data indicate that the discharges and sediments should be monitored to ensure that the discharge of metals would not be at a level that could pose a problem. As indicated in Table 2-3 of the Final SEIS, the monitoring plan includes monitoring of metals in the discharges and sediments.

set up to purchase the protection of other sensitive wetlands. 18-13 (cont.)

SUBSISTENCE

The Pt. Sherman area is the habitual corridor to over 50 percent of the salmon returning to all rivers of the upper Lynn Canal. The DSEIS states, "Adult salmon returning to Lynn Canal occur primarily along the eastern shore. ...The nearshore area off Comet Beach may be part of a larger shoreline region providing rearing habitat for pink and chum fry and sockeye smolt." The biological integrity of the Pt.Sherman area is critical to its Native and non-Native subsistence fishers. These projected impacts must be studied. While it may be true that Native subsistence fishers from Klukwan or Chilkoot do not fish at Comet Beach, any catastrophic event at Kensington would likely affect the subsistence users livelihood. 18-14

According to the DSEIS, "Executive Order 12962 requires Federal agencies to evaluate the potential effects of proposed Federal actions on recreational fisheries." 18-15

and "Executive Order 12898 requires Federal agencies to identify and address disproportionately high and adverse health or environmental effects of proposed activities on minority and low-income populations." Alaska Natives, as high end fish consumers susceptible to fish tissue contaminants, need to be protected. 18-16

CUMULATIVE IMPACTS

The Draft SEIS correctly notes that CEQ regulations for implementing NEPA require agencies to consider cumulative impacts of a project in conjunction with the impacts of other past, present, and reasonably foreseeable future actions. The Draft does not consider this a significant issue, however, and gives, at best, a cursory discussion of cumulative effects for the various alternatives. LCC maintains that cumulative impacts from the Kensington Gold Project, the Jualin Mine, the Lace River Hydroelectric Project, Echo Cove Development by Goldbelt, Inc., the Juneau Access Road, and Helicopter tours requested by Temsco for Berner's Bay are, in fact, a major issue that could profoundly impact the Berner's Bay area and other parts of Lynn Canal. To state, as in the Draft, that because plans for some of these projects are not yet permitted or approved and that their cumulative impacts are therefore "premature and speculative" is a blatant misinterpretation of the process for addressing cumulative impacts. The 18-17

Response to Comment 18-12

The Forest Service and ADF&G are required to ensure that potential impacts to fish habitat are minimized. The temporary Ophir Creek diversion under Alternatives B and D represent the least impact on fish habitat. Chapter 4 of the Final SEIS has been modified to indicate that the removal of 2,450 feet of habitat would have the "potential" for mortality of "up to" 125 to 170 Dolly Varden char. The original stream channel would be restored upon final reclamation, and Dolly Varden char would be expected to repopulate this reach.

Response to Comment 18-13

The Corps of Engineers regulatory program provides flexibility in implementing the goal of "no net loss of wetlands." The Alaska District reviews site-specific conditions on an individual basis in evaluating the extent of mitigation necessary for a particular permit action. Avoidance and minimization are two aspects of mitigation that the operator has pursued in developing the Proposed Action. Impacts to wetlands within the riparian zone of Sherman Creek from a tailings dam and pond would be avoided by constructing the DTF. Maximizing paste backfilling would minimize the extent of impacts to palustrine scrub-shrub wetlands in the Terrace Area. The operator also proposes to remove fill and restore wetlands within the area of the personnel camp and would leave sediment ponds and portions of the sand and gravel borrow areas as compensatory mitigation. Section 4.8.3 of the Final SEIS discusses the potential impacts to wetlands.

Response to Comment 18-14

The Forest Service recognizes the importance of the Point Sherman area fishery. Section 4.6 of the Final SEIS describes the potential impacts of each alternative on marine water resources. In general, the potential for a catastrophic event is very low. The effects of a spill event during diesel fuel transfer would be temporary and localized, as well as being limited by required mitigation measures. As a result, even in the event of a spill during fuel transfers, there should be no significant effects on overall fish habitat and populations in upper Lynn Canal.

Response to Comment 18-15

The Final SEIS complies with Executive Order 12962 by evaluating the potential impacts of each alternative on the project area. As noted in Section 1.6.1 of the Final SEIS, limited recreational fishing occurs in the project area. Also, please see the response to Comment 18-14.

Response to Comment 18-16

Presumably, the commentor is referring to the potential consumption of anadromous fish. According to Section 4.7 of the Final SEIS, the alternatives would not cause elevated metals levels in anadromous fish tissue. Section 3.9.4 of the Final SEIS describes how metals levels in tissue of Dolly Varden in upper Sherman Creek are below health effect levels and are expected to decrease during full-scale mining operations because of mine drainage treatment. As discussed in Section 4.11 of the Final SEIS, there would not be a disproportional high or low effect on minority or low-income populations.

Forest Service, Corps of Engineers, and EPA need to assume that the above mentioned projects will proceed, and assess cumulative impacts accordingly. 18-17 (cont.)

I. Aquatic Resources

The treatment of cumulative impacts to salt water aquatic resources is completely inadequate. Only the Lace River Hydroelectric Project is even mentioned under the Cumulative Effects heading. Fish are not mentioned as an aquatic resource; there appears to be an assumption that protecting water quality, sedimentation, and integrity of marine habitats would protect fish, but this ignores the impact of increasing numbers of humans in the project areas. Clearly, a second mine adjacent to Kensington (Jualin), a housing development at Echo Cove, and a road along Lynn Canal would create a tremendous increase in human access to marine resources and could have a major impact. Increased sport and subsistence fishing by new residents at the mine sites, the city of Juneau, and at Echo Cove would undoubtedly be substantial. What would this mean to current commercial, sport and subsistence fishers? (The FEIS notes that Pt. Sherman is not a major subsistence area, but does not mention that most subsistence fish in upper Lynn Canal pass very closely to Pt. Sherman.) How would increased road access interact with the high number of new residents? The Federal agencies need to address these concerns, as well as other impacts from construction activities, such as sedimentation, turbidity, etc. that could potentially affect marine resources. 18-18

II. Wildlife

Cumulative impacts to wildlife are not mentioned in the Draft SEIS. This seems to be an incredible oversight, given the Forest Service's mandate to protect viable and well-distributed populations of vertebrates throughout the Tongass. The FEIS lists black bear, brown bear, gray wolf, mountain goat, mink, bald eagle, and Vancouver Canada Goose as species of special concern that would be impacted by the Kensington Project, with mountain goat and black bear experiencing substantial impacts to local populations. It also acknowledges the possibility of cumulative impacts from both Kensington and Jualin to wildlife, but does not analyze these impacts in any meaningful fashion or discuss whether such impacts are acceptable. 18-19

Mountain goat winter range on the ridge between Sweeney Creek and 18-20

Response to Comment 18-17

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Response to Comment 18-18

Please see the response to Comment 18-17. The discussion of potential socioeconomic impacts includes an estimate of the population increase related to the Kensington Gold Project. This population increase is expected to be approximately 2 percent. Considering the number of boats currently operating within the Juneau area, it is unlikely that this minor population increase would "...create a tremendous increase in human access to marine resources...." Likewise, even if the road were constructed, it is highly unlikely that fishers operating from road access would be numerous enough to affect subsistence or commercial fishing harvests.

Response to Comment 18-19

The Draft SEIS does not address wildlife because the analysis conducted in the 1992 Final Environmental Impact Statement (FEIS) was determined to be adequate for changes to the project currently under analysis. Mitigation measures established for wildlife at that time are still applicable to the project are summarized in Table 2-2 of the Final SEIS.

Response to Comment 18-20

The nature of the project changes analyzed in the Draft SEIS did not require a reevaluation of wildlife population estimates; therefore, the Final SEIS references the analysis conducted for the 1992 FEIS. The 1992 FEIS addressed the pressures of hunting on local wildlife population. Increased hunting pressure is not anticipated as a result of the mining operation. Company policy prohibits employees from hunting in the project area (in this case, the permitted area) during their working "tours." Since most of the mine is located on Forest Service System Lands, the project area would have previously been and would continue to be open to hunting, according to ADF&G and Forest Service regulations. ADF&G would establish management policies for the area (as elsewhere), based on use and population dynamics.

Lynn Canal is of particular concern in considering impacts from several projects in the area. Increased hunting pressure alone, resulting from the factors mentioned above that would affect marine resources, could cause substantial reductions in game animals. The approximately 250 workers on site would be prohibited from hunting, trapping and harassing wildlife in the "project area." (This term needs clarification.) However, they could hunt and trap in the general area. Add to this a workforce from another mine, a substantial population at Echo Cove, and increased road access, and local impacts to wildlife could be severe. No mention is made of the fact that the Kensington Mine would essentially bisect, and therefore eliminate, wildlife travel corridors along the east side of Lynn Canal. This, in conjunction with the other projects mentioned, could cause serious disruption and displacement to species that are sensitive to human encroachment and disturbance. Certainly any disturbance caused by helicopter tours in the area would be an additive factor. Endangered and threatened species in the area include the American peregrine falcon, humpback whale, and Steller sea lion. The impacts of transportation of personnel and supplies to the mine site on whales and sea lions must be considered in conjunction with impacts from other projects. 18-20 (cont.)

Bird species of concern include the Queen Charlotte Goshawk and the Marbled Murrelet. Marbled murrelets utilize most of Lynn Canal in all seasons, including the Pt. Sherman and Berner's Bay area. The areas encompassed by Kensington, Jualin, the Juneau Road, and other projects should be surveyed for nest sites for these and other sensitive bird species and cumulative impacts should be assessed before any of the projects are permitted. 18-21

III. Recreation

The Draft does not mention cumulative impacts to recreation of the above mentioned projects, except by implication under Visual Impacts (page 4-67). The Berner's Bay area is a popular wilderness recreation area for Juneau residents, and the entire east side of Lynn Canal is utilized to some extent by kayakers, fishermen, hunters, sightseers, photographers, and other recreationists. At present, most of Lynn Canal, except for the towns of Haines and Skagway, is in pristine or nearly pristine condition and rivals Glacier Bay National Park in terms of scenic qualities. The cumulative visual, auditory, and recreational impacts of all of the proposed projects in this area could clearly change the present wilderness qualities of the area 18-22

Response to Comment 18-21

Birds of concern were considered in the analysis conducted for the 1992 FEIS. Please see the response to Comment 18-17.

Response to Comment 18-22

Please see the response to Comment 18-17.

to that of a major industrial zone. This needs to be analyzed and addressed by the Forest Service before considering permitting the Kensington Project. The Draft SEIS downplays the cumulative visual impact of Jualin by stating that it is in a different viewshed from Kensington. It also implies that motorists on the Juneau Road would be visually impacted by the tailings at Kensington, but does not consider the cumulative visual impacts of the road, the mines, and other projects as seen from Lynn Canal. This is a profound misinterpretation of the term "cumulative effects." 18-23

IV. Wetlands

All of the alternatives would disturb at least 250 acres of wetlands in the area, with a permanent loss of at least 51 acres due to the dry tailings facility. The Corps of Engineers needs to consider the cumulative impacts to wetlands from Kensington, Jualin, the Juneau Road, Echo Cove development, and Lace River Hydroelectric development. Because wetlands in the region of these projects are in essentially pristine condition, it will be difficult to undertake meaningful wetlands mitigation efforts in the immediate area of the proposed projects. However, efforts are currently underway by the Alaska Department of Fish and Game, Haines, in conjunction with Lynn Canal Conservation, the Haines 2005 Habitat Committee, and other interested members of the public, to rehabilitate degraded anadramous streams in the Haines area. These include Sawmill Creek, Big Boulder Creek and others. We suggest that Coeur could help to mitigate some of the wetland loss associated with the Kensington Project by contributing to the effort to restore riparian areas near Haines. A minimum three-to-one mitigation to wetlands loss ratio would be essential. 18-24

Another approach would be to contribute financially to a fund for the purchase and protection of local wetland areas of biological importance that are threatened by development. This could be administered by a trustee council similar to the Exxon Valdez Oil Spill Fund. In addition to wetlands, the FEIS notes that reclamation efforts "would not be able to replace old-growth habitats." The cumulative loss of old-growth forest from this and other projects needs to be considered prior to permitting. 18-25

FUEL DELIVERIES

The analysis of the fuel delivery plan is inadequate. The DSEIS states, "Under all alternatives, virtually no risk of a spill is associated with a barge sinking." This statement does not consider the circumstances of the site. 18-26

Response to Comment 18-23

Please see the response to Comment 18-17.

Response to Comment 18-24

The response to Comment 18-13 addresses a portion of this comment. As presented in Section 4.8.3 of the Final SEIS, the cumulative effects of wetland impacts have been considered as part of this analysis. Other considerations include the difficulty in conducting in kind, onsite mitigation to replace lost functions and values (as noted in the comment) and the extent of avoidance, minimization, and mitigation currently proposed. Ratios for mitigation (if required) vary, depending on such factors as the likelihood of mitigation success, the functions and values being lost and replaced, and the timeframe proposed for mitigation efforts. Although enhancing anadromous fish habitat could be considered mitigation, it would not necessarily address the loss of function and values related to muskeg wetlands that could be impacted by the project. A three-to-one ratio would not necessarily be appropriate for replacing the function and values of palustrine scrub-shrub (muskeg) wetlands with that of anadromous fish habitat.

Response to Comment 18-25

Please see the response to Comment 18-17. Although the area contains some old growth forest, the area was logged during previous mining and would not be considered as having an extensive amount of old growth. The Tongass Land and Resource Management Plan (TLMP) (USFS, 1997b) addresses the management of old growth at the Tongass National Forest level.

Response to Comment 18-26

Section 4.12 of the Final SEIS summarizes the mitigation and contingency measures identified by the operator in the C-Plan, SPCC Plan, and FRP. All onsite tanks and transfer facilities would have secondary containment. The greatest risk from offsite transport is associated with barge to shore transfer operations. Section 4.12.1 of the Final SEIS estimates the maximum spill during fuel transfers to be 880 gallons. Under all alternatives, the operator would be required to use a flexible transfer hose, which is pressure tested annually and inspected prior to each transfer. Individuals would be present at both ends of the line during transfer to facilitate immediate shutdown, if necessary. A boat with attached containment booms would be located at the beach area during all transfer operations to provide for rapid response. The onsite storage capacity would make it possible to avoid transfers during fish openings and adverse weather conditions (i.e., seas greater than 3 feet). Under the preferred alternative, the risks associated with onsite fuel transport by truck are low, and spill cleanup equipment would be placed at each end and in the middle of the haul road to facilitate cleanup.

As discussed in Section 4.12 of the Final SEIS, the probability of a catastrophic spill during barge deliveries of diesel fuel is very small. A catastrophic spill could result from a fuel barge grounding, collision, or other accident during transport causing a rupture in the vessel hull. No such spill events have occurred in the past 10 years, however, and the transporters have an excellent safety record.

The unloading facility is directly exposed to wind and weather from the north. In describing the sedimentation of Comet Beach, the DSEIS states, "These beaches are exposed to storm-generated waves from the north, which probably results in considerable physical disturbance ..." Given the prosed barge schedule of 3-4 per week and the prevailing north winds in the winter that typically blow 30-50 knots for weeks at a time, it is highly possible that a barge will be grounded on the nearby reef to the south and consequently spill its fuel. While Coeur has made promises of not landing barges in seas greater than 3 feet, there is no monitoring or enforcement available. Who has the responsibility of monitoring and enforcing this condition? 18-26 (cont.)

The gilnet fleet uses the area extensively from June-October. It would be prudent to not allow barge landings during fishing openings which vary from 2-5 days per week, 24 hours per day. Because of the biological diversity and sensitivity of the Pt. Sherman area, all fuel barges should routinely be boomed off with spill containment equipment as a measure of safety. 18-27

EFFECTS ON COMMERCIAL FISHERIES

The DSEIS fails to consider adverse effects to commercial fishermen in the event of a catastrophic failure or spill. This is an important existing industry for the Haines economy. Also important to the Haines economy are the sport fishing industry, the charter industry, and the fish processing industry. What impacts would spills or water degradation have on these industries? 18-28

MINE SHUTDOWN PROVISION

Because of the extremely sensitive and productive nature of Pt. Sherman waters adjacent to the Kensington Project, we encourage the Forest Service to require that Coeur notify all agencies within 24 hours of any violation of federal, state, of borough permits or other requirements, describing the nature of the violation. If the violation represents a serious risk to the biological integrity of Sherman Creek and/or Pt. Sherman waters, operations will shut down immediately until correctable. 18-29

RECLAMATION

Response to Comment 18-27

The barge companies that would deliver fuel to the Kensington Gold Project site are experienced in making deliveries under the types of conditions expected. According to the U.S. Coast Guard, there were no barge sinkings or damage related spills between 1986 and 1990. The requirement that fuel deliveries be avoided, wherever possible, in seas greater than 3 feet has been incorporated into the C-Plan. ADEC and the Coast Guard would oversee implementation of the C-Plan, as noted in the Final SEIS.

Response to Comment 18-28

As indicated in Section 4.6 of the Final SEIS, the Kensington Gold Project would not affect the commercial fishery in the project area. In addition, it is unlikely that the project would result in adverse impacts to sport fishing, the charter industry, or the fish-processing industry.

Response to Comment 18-29

The various permits and authorizations for the Kensington Gold Project contain specific reporting and notification requirements for violations. The Forest Service does not have the authority to establish timeframes for notification or to require facility shutdown for violations of permits or authorizations issued by other Federal, State, or local agencies.

The long term biological and visual effects of this project are going to be determined by the volume of tailings exposed to the elements. It is therefore essential that Coeur be required to backfill the maximum amount of its tailings. The DSEIS states, "Due to the swelling and mixing with water and cement, the operator theoretically could paste backfill all of the open stopes in the mine with only about 60 percent of the tailings volume produced at the Kensington Gold Project." At least 50 percent should be backfilled. 18-30

The long-term stability of the DTF depends on the successful diversion of upslope run-off. How are DTF diversions going to be maintained forever? 18-31

CONSTRUCTION

The DSEIS says that the USFS would require the following additional BMPs as mitigation measures: "Avoid construction activities in Sherman Creek and its tributaries during critical life stages of anadromous fish. In general, this would range from adult entry into lower Sherman Creek until fry left the watershed." Assuming that adults entered in June and fry emerged the following Spring, how would Coeur complete construction under this requirement without significant impacts to Sherman Creek? 18-32

CLOSING

LCC supports the recommendations of the Kensington Coalition and refer the USFS to those comments that are not covered here. We thank you for this opportunity to comment and look forward to your incorporating these suggestions into the final plan.

Sincerely,

Tim June (for LCC)

Response to Comment 18-30

Please see the response to Comment 5-5.

Response to Comment 18-31

The storm water diversions above the DTF would be enlarged during final reclamation to convey peak flows that would occur from the 500-year, 24-hour storm event. The Forest Service would review and approve the final design of these diversions before final reclamation. Large channels of this type are often designed to have smaller, low-flow notches or channels within them. Low-flow channels are designed to concentrate lower stream flows and provide flow velocities sufficient to prevent long-term aggregation of debris or bedload materials. The channel then would become self-maintaining.

Response to Comment 18-32

ADF&G would coordinate with the Forest Service to identify critical periods for anadromous fish in Sherman Creek in order to minimize impacts during in-water construction activities. Spawning salmon would be present from late summer into the fall, and eggs would be incubating in the gravels of lower Sherman Creek until out-migration, which begins in April and lasts until early summer. ADF&G has suggested that in-water work be allowed to occur from approximately early June through early August. Section 4.7 of the Final SEIS has been modified to outline this BMP. Comment 32-4 presents ADF&G's position on this issue.

ALASKA MINERS ASSOCIATION, INC.
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March 31, 1997

Mr. Roger Birk
EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, AK 99801

RE: Draft SEIS for Kensington Mine

Dear Mr. Birk,

Thank you for the opportunity to again comment on permitting for the Kensington Mine. We have followed this important project for more than 10 years and trust that the SEIS can be completed in a form that will allow the mine to begin construction at the earliest possible date.

We are in support of the Kensington Mine project. We also wish to provide some comments on the latest Draft Supplemental Environmental Impact Statement.

We urge the USFS to remove the requirement for a berm around the dry tailings facility (DTF). We are not aware of any new technical data that would indicate that such berms are necessary or justified. On the contrary, technical data from other projects supports the fact that the DTF does not require berms. The monitoring program being proposed for the DTF will show if the berm is needed, and there will be ample opportunity to install the berm if the need were to develop. Given the monitoring program, and the absence of new data and engineering studies showing the need for the berm, it is arbitrary and capricious to require a berm around the DTF. 19-1

We urge that the backfilling requirements be limited to those proposed by the operator. Actual mine conditions will dictate how, how much, and when backfilling will be feasible. It is not appropriate to prejudge the smallest details of this aspect of the mine. The operator must have the maximum possible flexibility if he is to operate safely and profitably, and must have the ability to make changes without artificial restrictions that have been added in a SEIS in what will by then be distant history. The SEIS must insure that the environmental impacts of a project are acceptable, but it must not infringe on the operating flexibility for the life of the mine. 19-2

The USFS should not attempt to include speculative cumulative impacts beyond those impacts that are now of an imminent nature. Speculation into the future beyond this point is meaningless. For example, who would have dreamed five years ago that most of the logging in the Tongass would be ended by 1997? 19-3

RESPONSES TO COMMENTS
Commentor No. 19; Alaska Miners Association, Inc., Steven C. Borrell, P.E.

Response to Comment 19-1

Please see the response to Comment 3-1.

Response to Comment 19-2

Please see the response to Comment 5-5.

Response to Comment 19-3

NEPA requires the consideration of cumulative effects as part of the environmental impact statement. The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

The body of knowledge regarding salmon and total dissolved solids (TDS), as well as the data that has been developed over the past several years in the Sherman Creek drainage, shows that there has been no adverse effect on fish populations or on fish migration. Under the site specific criteria requested there will be no change to TDS. 19-4

We support the findings and interpretation by the Corps on Engineers that compensatory mitigation is not required. The reclamation and wetlands mitigation principles followed are appropriate for this location and no further or more detailed or more intense efforts can be justified. 19-5

Thank you again for the opportunity to comment on this DSEIS. We now urge the USFS to move forward, even in the face of opposition by those that do not want any mining in Alaska. Short of blocking all mining, you will never satisfy these groups. The USFS must do its job by developing this SEIS, and bring it and this painful and protracted planning process to closure

Sincerely,

Steven C. Borell, P.E.
Executive Director

cc: Gretchen Keiser, CBJ Planning Commission
Ben Cope, EPA
Victor Ross, Corps of Engineers

Senator Ted Stevens
Senator Frank Murkowski
Congressman Don Young
Governor Tony Knowles

Response to Comment 19-4

Please see the response to Comment 4-5.

Response to Comment 19-5

Please see the response to Comment 18-13.

United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
1689 C. Street, Room 119
Anchorage, Alaska 99501-5126

ER 97/113

April 14, 1997

RECEIVED
APR 21 1997
Juneau Ranger District

Mr. Roger Birk
EIS Team Leader
Juneau Ranger District
U.S. Forest Service
8465 Old Dairy Road
Juneau, Alaska 99801

Dear Mr. Birk:

In response to your February 18, 1997, request, we have reviewed the Kensington Gold Project, Draft Supplemental Environmental Impact Statement (EIS). We offer the following comments for your consideration.

We believe the revised project plan has the potential for fewer adverse effects on fish, wildlife, and habitats found in the project area. Deletion of ore cyanide treatment and wet tailings storage design were our major concerns in the original project plan. Potential adverse impacts associated with these methods have now been eliminated.

We remain concerned, however, with the proposed dry tailings facility alternative. The berm design should be sufficient to support the dry tailings, as stated in Section 4.2.6 of the EIS. Although there is a discussion of possible failure of DTF slopes (Section 4.2.3), we suggest there be a contingency plan in the event of a seismic or some other unforseen occurrence that could cause collapse of the tailings pile. We suggest corrective measures to be employed if the tailings pile were to slough and reach the waters of Lynn Canal be described in detail. Potential long-term impacts on Lynn Canal's commercial fisheries from such an incident should also, we believe, be addressed in the Final EIS. We suggest this scenario be included in the Final EIS section on potential impacts to the area's marine resources (Section 4.6). 20-1

In the summary of fuel storage and transport (Section 4.12.7), we suggest the spill scenario discussion be expanded. We believe this section should include discussion of a contingency plan for diesel spill events and that there should be additional discussion of potential barge and loading dock fuel spills. We believe that details on a worst case situation would be useful in Section 4.6.2 of the Final EIS. We further suggest that the contingency plan for spill incidents be summarized and referenced within the Final EIS. 20-2

We believe the discussion of cumulative effects should be presented in more detail to provide a realistic view for the reader. Details on estimates of potential acreage disturbance and increased 20-3

RESPONSES TO COMMENTS
Commentor No. 20: U.S. Department of Interior

Response to Comment 20-1

The inclusion of the berm under Alternative D minimizes any potential risk of a major slope failure. In determining a potential worst-case slope failure, the Forest Service evaluated the impacts of a reasonable failure scenario. If the contents of the DTF were to flatten out to a 10:1 slope, tailings would not actually reach Lynn Canal. Tailings from such a failure could reach Sweeny or Sherman Creeks, producing sediment roadings; however, the long-term impacts to the creeks would be minimal. Section 4.2 of the Final SEIS discusses these potential impacts. Also, see the response to Comment 18-3.

Response to Comment 20-2

Please see the response to Comment 18-26. Section 4.6 of the Final SEIS describes the worst-case spill event associated with transfer operations.

Response to Comment 20-3

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

boat traffic with additional projects (such as the Jualin Mine, the proposed road to Haines, Goldbelt development in Echo Cove, and the Lace River Hydroelectric Project) should, we believe, be included in cumulative impacts assessment and discussion in the Final EIS. 20-3 (cont.)

We suggest further reassessment of avalanche pathways and potential effects on the Ophir Creek diversion. The snow-avalanche hazard map (Figure 3-10) would be more useful as an overlay on the site development map to identify possible impact areas. If a high risk avalanche path is found above the Ophir Creek diversion, then we believe a contingency plan to address an avalanche event should be discussed in the Final EIS. 20-4

Because of drainage pattern modifications to the on-site, unnamed streams' natural flows, new defined stream bed channels may form at the stream mouths where water presently flows into the beach gravel/cobble. We suggest this stream channel modification be monitored on an annual basis because salmon may be attracted to these streams as spawning habitat, once marine access is created. If natural stream conditions are not maintained because of use of culverts and other conduits (Section 4.7.2), annual evaluation of stream diversion effectiveness will be needed to ensure minimal scouring and sedimentation and to allow fish passage. We believe an annual evaluation would allow for any necessary modifications before the next year's salmon spawning period. We suggest the Final EIS address these issues. 20-5

We believe that using paste backfilling as a tailings disposal method is a desirable technique to reduce the amount of surface disposal. If the potential exists to use more than 25 percent of the tailings in this technique, we suggest that this possibility be added to the discussion. 20-6

We suggest that discussion of project closure options and contingency plans in the event of unexpected difficulties (i.e., a major drop in gold prices) be added to the Final EIS to address impacts from long-term operation and eventual shut-down of the project. 20-7

We appreciate the opportunity to provide comments on the Draft Supplemental EIS.

Sincerely,

for Regional Environmental Officer - Alaska

Response to Comment 20-4

Section 4.2 of the Final SEIS provides an analysis of and discusses the potential impacts from avalanches under Alternatives A through D. This section also discusses potential effects on mining facilities and mitigation measures.

Response to Comment 20-5

The proposed DTF discharges from the sediment pond and from the storm water drainages could cause defined channels to form across the beach cobbles to Lynn Canal. Visual observation of the beach and cobbles in this area suggests that large flow velocities would be required to create a defined channel. Additionally, a very abrupt steep slope (i.e., cliff in some cases) occurs approximately 200 feet directly behind the beach. The Terrace Area, the proposed DTF site, is approximately 150 to 200 feet above the beach on a natural topographic bench. Depending on the final design of the discharge points and drainage channels, this naturally steep topography would create an anadromous fish barrier approximately 200 feet from Lynn Canal. The comment regarding monitoring for use by anadromous fish has been noted, should channels develop in this area. The selected alternative in the Forest Service Record of Decision requires the use of bridges rather than bottomless conduits. The bridges should virtually eliminate concerns regarding sedimentation and scouring at road crossings.

Response to Comment 20-6

Please see the response to Comment 5-5.

Response to Comment 20-7

Section 4.11.2 of the Final SEIS discusses the socioeconomic effects of an early shutdown. The Reclamation Plan given in Appendix C also discusses the steps that would be taken with an early closure of the mine.

John R. Swanson
3400 Edmund Blvd.
Minneapolis MN 55406

31 March 1997.

Tongass National Forest
8465 Old Dairy Road
Juneau, Alaska 99801.

Dear Sirs;

Please accept my following Comments concerning the Kensington Gold Project, Draft Supplemental Environmental Impact Statement, Tongass National Forest.

I wish to advise that I oppose the Kensington Gold Project.
As this project will destroy air, water, marine aquatic, 21-1
fresh water aquatic, vegetation, wetlands, visual, soil, wildlife.
and recreation resources.
and create massive noise pollution problems. 21-2
May I suggest that this gold project appears to violate the 21-3
clean air act, 21-4
clean water act, and 21-5
Endangered Species Act.

Sincerely,

John R. Swanson.

RESPONSES TO COMMENTS
Commentor No. 21: John R. Swanson

Response to Comment 21-1

Thank you for your comment. The Final SEIS fully describes all potential impacts to these resources and discusses mitigation measures that would be implemented. A detailed discussion of potential impacts to wildlife resources was presented in the 1992 FEIS and incorporated by reference in the Final SEIS.

Response to Comment 21-2

Noise from blasting is not expected to reach Lynn Canal because the size of the blasts would be limited and the mine workings would be well removed from (and much higher than) Lynn Canal. Although barge traffic would increase, the noise level produced by individual barges would not. Therefore, an increase in barge traffic is not expected to produce an impact beyond those discussed in the 1992 FEIS.

Response to Comment 21-3

The operator has received an air quality permit from the Alaska Department of Environmental Conservation (ADEC). Modeling suggests that emissions from the mining operation would be within limits established in the permit.

Response to Comment 21-4

Under Alternative D, the project would meet all Clean Water Act requirements, as described in the final and draft NPDES permit and fact sheet.

Response to Comment 21-5

A detailed discussion of potential impacts to wildlife resources was presented in the 1992 FEIS and incorporated by reference in the Final SEIS. This analysis concluded that no direct loss of critical or important habitat for any federally or State-listed threatened and endangered, proposed, or candidate wildlife species would occur with project development. See page 4-72 of the 1992 FEIS. No threatened or endangered plant species are known to occur at the site.

31 March '97

Roger Birk - EIS Team leader
Juneau Ranger District
Juneau, AK 99801

Dear Mr. Birk,

I am concerned about adverse effects the Kensington mine may have on the Lynn Canal. I would like to see the Forest Service take an aggressive role in protecting the Lynn Canal by creating + maintaining strict standards on all activities that have potential in adversely effecting the Lynn Canal. 22-1

Please fully evaluate the cumulative impacts from all past, present, & reasonably forseeable future actions in Berners Bay watershed; 22-2

ensure the amount of tailings returned to the mine approaches 50% + that process begins at the outset of operations, 22-3

evaluate monitoring requirements + all other pertinent actions that may adversely effect the Lynn Canal. 22-4

Thank you -

Laurie Dadourian

P.O. Box 288
Haines, AK 99827

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APR 03 1997
Juneau Ranger District

RESPONSES TO COMMENTS
Commentor No. 22: Laurie Dadourian

Response to Comment 22-1

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

Response to Comment 22-2

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Response to Comment 22-3

Please see the response to Comment 5-5.

Response to Comment 22-4

Section 4.6 of the Final SEIS discusses the potential impacts to Lynn Canal. Table 2-3 of the Final SEIS outlines monitoring requirements for each resource.

RECEIVED

APR 03 1997

Juneau Ranger District

5601 Tonsgard Court
Juneau, Alaska 99801
April 1, 1997

Roger Birk, EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, Alaska 99801

Re: Kensington Mine - USFS Draft Supplemental Environmental Impact Statement

Dear Mr. Birk:

I am writing in support of the Kensington Mine Project. The project has been studied, changed in response to concerns expressed by community groups, and then studied again. The project is sound and Coeur has demonstrated its commitment to the environment and the community. The regulatory agencies involved should stay on schedule, not extend the public comment period, and should permit the project. I support the mine for the following reasons:

1. Cumulative Impacts - Kensington Mine is located in a remote location and its present permit applications are for a mine plan that does not rely on, or serve as a necessary trigger for, any other reasonably foreseeable future or proposed project in the vicinity. Thus, there will be no cumulative impacts caused by the Kensington Mine. The Forest Service should not engage in a cumulative impact analysis that speculates way into the future about any possible project around the Point Sherman area. The more one speculates, the subjective the inquiry becomes. 23-1

2. Fish - Since 1989 Coeur has monitored and studied salmon migration and escapement in Sherman Creek. The total dissolved solids has been the same value during that period and will remain at that same value during the mine operations under the site specific criteria requested by Coeur. There has 23-2

1

RESPONSES TO COMMENTS
Commentor No. 23: William A. Corbus

Response to Comment 23-1

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Response to Comment 23-2

Please see the response to Comment 4-5.

been no effect on fish populations or their migration. 23-2 (cont.)

Very truly yours,

William A. Corbus

William A. Corbus
Tel: 586-6208

Copy to: Ben Cope, EPA
Victor Ross, U.S. Army Corps of Engineers

P.O. Box 210035
Auke Bay, AK 99821
(907) 789-6360

April 1, 1997

RECEIVED
APR 03 1997
Juneau Ranger District

Roger Birk, EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, AK 99801

Dear Mr. Birk:

As residents of Juneau, we must look at the overall effects of having a gold mine in our locality. The impetus of industry is to come and extract resource for a large profit. However, the effects of their presence could be very harmful to the environment and socioeconomic condition of Juneau. This is why complete analysis and projections need to be addressed to all of us affected by a proposal such as the Kensington Gold Mine. 24-1

I urge the Forest Service to describe and evaluate the cumulative impacts that will affect the Berners Bay area. What needs to be addressed, not excluding the Kensington Mine, are the many support industries that go along with having a large operating mine close by. Right now, Echo Bay is a peaceful, accessible, undeveloped area enjoyed by people who like to recreate. There are becoming fewer of these "safe havens" for people to get away from the city to fish, camp, kayak and boat as development encroaches upon the uninhabited borders. With a mine of the magnitude proposed, it will need power, dwellings, boat access, to name a few. How is all of this planned for? How is boating, kayaking, and fishing going to be affected by high-speed ferries? Have the impacts of such activities been addressed? How are animal populations going to fare with helicopter flights in the vicinity? Hydroelectric plants near watersheds? 24-2

Another area that needs to be solidified is the amount of tailings returned to the mine shaft. With so much churned-up earth, the least exposed in dry tailings piles, the better. Therefore, it is important the Forest Service mandates at least 50% be returned to the mine. To ensure the safest alternative to depositing tailings, a berm around the dry tailings could prevent foreseeable disasters intrinsic to location. The plan also needs to protect fish habitat from any slope failures, spills, and discharge mine drainage water. The protection of marine life and fisheries is of extreme importance. 24-3

The last issue the Forest Service needs to describe and evaluate is the monitoring requirements for the Plan of Operations. All of these issues need to have detailed plans of developmental impact to those who live and play in the Berners Bay area, be it animals, fish or humans. Let us not wait until it is too late to make conservative decisions. If the gold mine is approved, let it be done properly with foresight and cooperation, for the least impact possible. 24-4

Sincerely,

Anissa Berry-Frick

RESPONSES TO COMMENTS
Commentor No. 24: Anissa Berry-Frick

Response to Comment 24-1

The Draft SEIS evaluated environmental and socioeconomic impacts that could arise from operation of the Kensington Gold Project. The public had the opportunity to provide comments during the scoping phase and following publication of the Draft SEIS. Section 1.3 of the Final SEIS discusses the scoping phase.

Response to Comment 24-2

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Response to Comment 24-3

Please see the response to Comment 5-5.

Response to Comment 24-4

Please see the response to Comment 5-3.

Vanguard Research / Cultural Resource Consultants
7000 E. Shingle Mill Rd. • Sandpoint, Idaho 83864 (208) 263-3273

Archaeological Survey | Cultural Resource Inventories | Ethnographic and Archival Research | Oral History

April 2, 1997

RECEIVED APR 0? 1997 JUNEAU RANGER DISTRICT

Roger Birk
EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, Alaska 99801

Dear Mr. Birk:

I would like to make the following comments concerning the cultural resource section of the Draft Supplemental EIS for the Kensington Gold Project. Section 4-9 of the SEIS states that "Additional literature search, consultation with Native American Tribes, ground truthing, and testing would be required to confirm the presence or absence of cultural resources at some locations within the project area.". As an archaeologist with extensive survey experience in SE Alaska I agree completely with the need for additional site survey with a particular focus on determining whether significant prehistoric sites are present within the area of direct or indirect impact from the Kensington Gold Project. 25-1

Prior archaeological survey conducted for the initial EIS as reported in a 1988 technical report by Ed Hall and Associates titled *A Cultural Resource Site Baseline Study of Proposed Construction Areas Performed in Conjunction with the Kensington Project, Southeast Alaska* appears to me to me inadequate in terms of evaluating the Project area for the presence of prehistoric or early contact period Native sites. A follow up 1991 Edwin S. Hall report, titled *A Comprehensive Analysis of known Cultural Resource Data for the Kensington Mine Area,* states "The determination that the historic site of Kensington Mill is no longer a significant cultural resource does not absolve developers from the responsibility of insuring that construction activities do not threaten cultural remains representing earlier resource exploitation in the same area" (Hall 1991:4). The same report states that "Areas within the Kensington Prospect exhibiting the greatest potential for sites of any period are the Sweeny Creek and Independence Creek mouths inland for a distance of 100m. Access to the 15 m bench, prominent land forms for overlooks, and sheltered camp sites are all available at these locations. Similar, yet less attractive, conditions exist on the north side of Sherman Creek" (Hall 1991:8). 25-2

In 1987 Bruce Ream, conducting reconnaissance level survey for Ed Hall and Associates identified "a series of raised beach ridges ....located within the forest fringe about 25-35m from the present shore... Ridges were noted from Sweeny to Independence Creek and generally abutted the base of a 7-10m high rock seawall (Hall 1988:21). Ream states that "these raised ridges, especially those located behind crescentic beaches, have potential as temporary travel camp locations......Sites in similar contexts have been found on Prince of 25-3

RESPONSES TO COMMENTS
Commentor No. 25: Vanguard Research, Robert C. Betts

Response to Comment 25-1

Additional site surveys were completed during spring 1997. Section 3.13 of the Final SEIS summarizes the survey results.

Response to Comment 25-2

The Forest Service is familiar with the 1988 cultural resources reports prepared by Ed Hall and Associates discussed in the comment letter. The results and recommendations of these reports were summarized on page 3-67 through 3-70 and 4-82 through 4-83 of the 1992 FEIS and referenced in Section 3.13 of the Final SEIS.

Response to Comment 25-3

One raised beach ridge south of Sherman Creek is located within the area that would be affected by construction of the DTF under the selected alternative identified in the Forest Service Record of Decision. Section 2.5 of the Final SEIS identifies mitigation measures to be taken to avoid potential impacts on cultural resources in such areas.

Wales Island..." and he goes on to state that these raised marine terraces have "potential for temporary camp sites of early Ground Hog Bay 2 vintage along this contour" (Hall 1988:21-22). The Ground Hog Bay II site, located on Icy Strait not very distant from the Kensington Project, is one of the earliest prehistoric sites known in SE Alaska. 25-3 (cont.)

It does not seem apparent from the 1988 and 1991 reports by Ed Hall and Associates that any subsurface testing for prehistoric sites has previously been conducted at the mouth of Independence Creek or along the raised marine terrace and beach ridges reported by Ream between Swanson Creek and Independence Creek. Archaeological survey conducted at the mouth of Swanson Creek by Greg Gerlach for Ed Hall and Associates identified "Two pits or depressions shaped more or less like the remains of rectangular semisubterranean houses with entrance passages....."(Hall 1988:29). Gerlach placed a single small test pit in each of the depression and reports that "the largest pit, which may have been lined with flat stones much in the manner of a salmon storage pit, produced broken bottle glass of a generally modern type"(Hall 1988:29). Historic debris was also recovered from the test in the smaller of the two depressions. There is no further discussion of these depressions after reporting the historic debris recovered in the reconnaissance testing. The question of whether these depressions were historic features or prehistoric housepits or cache pits into which historic trash was later thrown is never resolved by further archaeological investigation. Another "fairly large depression" with "numerous fairly large trees growing out of the center of it" was found by Gerlach on the north side of the mouth of Sweeny creek (Hall 1988:30). One small test in this depression produced a piece of black plastic tarp but, again, the nature of the depression was never archaeologically determined. 25-4

Traditional aboriginal use of the Sherman Creek area is evident from a 1928 map included as Chart 2 in Possessory Rights of the Natives of Southeast Alaska (Goldschmidt and Hass 1946). This map, reproduced in Goldschmidt and Hass, comes from D.S. Davidson's Family Hunting Territories in Northwestern North America originally published in *Indian Notes and Monographs*, Misc. Series 46, New York Museum of the American Indian, Heye Foundation (1928). The Davidson map shows a fairly restricted area immediately north of Point Sherman (apparently including the Kensington Gold Project area in the vicinity of the mouth of Sherman Creek) to be the traditional hunting territory of the *Lukax -adi* (Sockeye-Raven) Clan from the Haines area. 25-5

The steep exposed bedrock eastern coast of Lynn Canal provides very few campsite locations and every creek mouth where it is possible to land a boat and which provides even minimal shelter, firewood, and access inland has to be considered as having relatively high potential for prehistoric sites for an aboriginal Tlingit culture oriented towards maritime hunting and travel. As a sea kayaker myself, I am especially aware of the danger of crossing large bodies of open water in rough weather and, for prehistoric paddlers traveling south down the east coast of Lynn Canal, the campsites available at the mouths of Independence Creek, Sherman Creek, and Sweeney Creek would make natural places to seek shelter or a campsite before facing the Berners Bay crossing in darkness or rough weather. 25-6

Response to Comment 25-4

The depressions at the mouths of Sherman and Sweeny Creeks were investigated since publication of the Draft SEIS. No evidence of prehistoric remains was observed at any of the sites. Section 3.13 of the Final SEIS was modified to include this information.

Response to Comment 25-5

This comment is correct. The Goldschmidt and Hass map (1946) shows this area to be traditional hunting territory of the Chilkat, including members of the Sockeye-Raven Clan. The traditional territory of the Chilkat was larger than the hunting territory shown on this map, however. The traditional territory included Lynn Canal and the lands draining into Lynn Canal, extending to Point St. Mary, south of Point Sherman. Consultation with contemporary Alaska Natives (i.e., Chilkat, Chilkoot, and Auke) conducted in 1997 for the Kensington Gold Project confirms the recent history and ongoing use of Lynn Canal by the Chilkat for traditional hunting and fishing, as well as commercial fishing.

Response to Comment 25-6

Please see the responses to Comments 25-2, 25-3, and 25-4.

I would like to see additional cultural resource investigations for the SEIS include an intensive archaeological survey with subsurface testing of the areas identified in the 1988 and 1991 Ed Hall and Associates reports as having high potential for prehistoric sites. 25-7

Sincerely,

Robert C. Betts

Robert C. Betts
Project Archaeologist

Response to Comment 25-7

Please see the responses to Comments 25-2, 25-3, and 25-4.

Friends of Berners Bay
949 Goldbelt
Juneau, AK 99801

April 2, 1997

Roger Birk, EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, AK 99801

RE: Comments on Kensington DSEIS

Dear Mr. Birk:

The following comments are provided on the Kensington DSEIS:

1. Before approval for the Kensington mine is given, all secondary impacts associated with that mine should be evaluated. This means that impacts of a number of projects currently planned for the Berners Bay area should be evaluated along with the mine in the mine's SEIS because they represent obvious secondary impacts that are directly associated with the mine. A list of these projects includes: a) the Lace River hydroelectric project (project representatives have stated that the reason for existence of their project is to sell electricity to the Kensington mine); b) the proposed road from Juneau to Skagway; c) the Jualin Mine and any secondary impacts that it may bring with it (this is related to Kensington because start-up of Kensington will make the economics of start-up of Jualin more attractive; thus start-up of the Kensington mine has a significant potential to cause start-up of Jualin); d) the logging, road building, and small community development proposals by Goldbelt Corp. in the Echo Cove area (because these developments so remote from other population areas are obviously planned to take advantage of logistic demands that both mines will bring). 26-1

An example of the depth of analysis needed on the Kensington SEIS is the proposed Lace River hydro project. What will be the method of transmission of power to the mine? Above-ground towers? Submarine cable? What will be potential environmental impacts from these alternatives? 26-2

RESPONSES TO COMMENTS
Commentor No. 26: Friends of Berners Bay, Dick Farnell

Response to Comment 26-1

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Response to Comment 26-2

The proposed Lace River Hydroelectric Project is discussed only to the extent that its presence, if constructed, could contribute to cumulative impacts to the area. A May 12, 1997, letter from Coeur d'Alene Mining Corporation to the Forest Service indicates that the operator will not pursue obtaining power from Lace River Hydroelectric. The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

The fact that a secondary project may have an extensive list of impacts itself is not an excuse for avoiding a full evaluation of that project in the Kensington SEIS, because one of the main purposes of the EIS process is to evaluate impacts that will result from a given activity. Since the main project causes the secondary projects to occur, an evaluation of the secondary projects is required.

In addition to evaluating secondary impacts, the cumulative effect of all these projects should also be evaluated together, not just each in its own isolated setting. This will give a true picture of the total effect of operation of the Kensington mine. 26-3

2. The Forest Service's analysis of resources and impacts listed in the Draft SEIS is inadequate to non-existent. In addition to listing impacts and resources, an analysis is required as to what potential effect operation of the Kensington mine and all associated impacts will have on that resource or activity. For example, what impact will increased small and large boat traffic have on marine mammals that now visit the Bay? Are whales expected to shun the Bay when boat traffic increases, as has happened in Glacier Bay? Will there be fewer sea lions in the Bay as a result of increased boating and boating noise, and will this alter the food chain ecology of the annual species migration to the Bay? Will any of the projected activities associated with the mine have any effect on the herring spawning activities, which have dwindled all over the rest of Lynn Canal? Will human wilderness recreation potential in the Bay decrease as a result of the increased motorization that will accompany development, and if so will they cause an increased concentration elsewhere that will be detrimental? 26-4

3. The impact on marine mammals of noise associated with the project and all its related activities as discussed above should be studied and evaluated (examples of potential noise impacts: blasting from mine transmitted via ground to the water environment; noise from ferries or other large vessels; increased small boat traffic noise). 26-5

4. It was stated that 70 acres of old growth trees will be removed for the Kensington project. The SEIS needs to research and discuss what impact that will have on marbled murlets that utilize old growth for habitat. This species is potentially threatened and may be listed as endangered. Also, the old growth lost in other areas of the Bay as a secondary impact will need to be included in this study, since the SEIS needs to evaluate all impacts related to 26-6

Response to Comment 26-3

NEPA requires the consideration of cumulative effects as part of the environmental impact statement. The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Response to Comment 26-4

The Kensington Gold Project is not expected to increase boat traffic in Berners Bay. Sections 4.12.1 and 4.12.2 of the Final SEIS discuss projected increases in barge traffic in Lynn Canal for Alternatives A through D. Projected increases are small and are not expected to impact marine mammals.

Response to Comment 26-5

Please see the responses to Comments 21-2 and 26-4.

Response to Comment 26-6

Page 4-71 of the 1992 FEIS assesses the potential impacts to marbled murrelets. Most of the projects considered in the cumulative impacts analysis would not disturb significant amounts of old growth. Please see the response to Comment 18-25.

the project. This means that the effect on marbled murlets from removal of any old growth that will be cut in conjunction with any of the other projects mentioned in item 1. will need to be considered along with the 70 acres cut for the mine directly. This impact needs to be addressed over the lifetime of the mine. 26-6 (cont.)

5. The USFS records of wildlife and marine populations appear to be based on old data. The latest data available should be used. 26-7

6. The significant marine wilderness recreation opportunities associated with the Berners Bay area should be fully evaluated, and the impact of each of the above described projects on wilderness recreation there should be evaluated. A high degree of significance should be placed on wilderness activities in the Berners Bay area due to the fact that Juneau residents have no other marine wilderness recreation areas that match Berners Bay and which are as easily accessible from the Juneau road system. 26-8

7. A 50% tailings return rate to the mine should be specified to minimize unneeded impacts to the land, and this should be implemented at the start of operations. 26-9

8. Protection for the dry tailings and associated pipeline should include a structural berm. The DSEIS states that without a berm there is a low to moderate risk of the tailings pile collapsing - a low to moderate risk is unacceptable, especially considering that the tailings will be left for thousands of years. 26-10

9. The Forest Service should describe and evaluate monitoring requirements for the Plan of Operations so that the potential adverse impacts can be properly anticipated and targeted. 26-11

10. There is no mention in the plan of the domestic drinking water system that the mine will use. The drinking water source, and any treatment required by State regulations, should be mentioned. This is important to ensure that an adequate supply of potable water is available for the mine before full scale mining activities start which could possibly preclude use of some sources of water. 26-12

In addition, the DSEIS states that domestic wastewater disposal will be via a leach field. The Forest Service needs to require the company to prove it has 26-13

Response to Comment 26-7

Please see the response to Comment 18-20.

Response to Comment 26-8

The cumulative impacts associated with this analysis are being evaluated in terms of those resources to which the Kensington Gold Project could contribute cumulative impacts. Since the proposed mine is not located within the Berners Bay watershed or viewshed, the cumulative impacts discussion does not focus on Berners Bay. Visibility of the mine facilities from Lynn Canal was identified as a significant issue during scoping. Visibility was not identified as an issue for Berners Bay. The cumulative impact analysis includes Berners Bay only where the Kensington Gold Project would directly affect Berners Bay.

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Response to Comment 26-9

Please see the response to Comment 5-5.

Response to Comment 26-10

The preferred alternative includes the construction of a berm around the DTF. Please see the response to Comment 5-1.

Response to Comment 26-11

Please see the response to Comment 5-3.

Response to Comment 26-12

Section 2.3.5 of the Final SEIS presents estimated water demands for all alternatives. Both potable and total domestic water demand were conservatively estimated from the maximum size of the personnel camp and for operational needs during both construction and operations. The operator has applied to ADNR for water withdrawal on upper Sherman Creek of 0.7 cfs (314 gpm) to meet demands. Under this permit, the mine would not be allowed to withdraw water below the instream flow levels, which are presented in Table 4-16 of the Final SEIS. The operator would determine how to manage potable water demands within the permit limits, including expected use of mine water as an alternative water supply.

Response to Comment 26-13

The operator has received State approval for the leach field at the process area, including demonstrating compliance with all State requirements. The State solid waste permit addresses construction and operation of the leach field.

suitable soils as per State regulations prior to initiating development, since lack of leachable soils will preclude that option for the company. A more expensive treatment option may then be required which would change the economic decisions for the company. 26-13 (cont.)

If chlorine will be used as a disinfectant for the domestic drinking water supply, its use should be stated in the DSEIS. Currently the DSEIS states that no chlorine will be used at the facility. 26-14

11. The possible effects of discharged mine drainage water on migrating salmon and other marine life should be evaluated. The economic effects of losses in the commercial fishing and seafood industry due to mine system failures should also be evaluated. 26-15

12. The adequacy of the oil spill contingency plan for the docking facilities should be evaluated, especially the need for pre-emptory booming of the fuel barge during fuel deliveries. The potential for spilled fuel, especially in catastrophic quantities, to cause an economic disaster during commercial fishing season in northern Lynn Canal should be evaluated in this regard. Economic impacts to the entire statewide commercial fishing industry should be kept in mind when making this evaluation, as a buyer perception of contaminated Alaska fish will depress the market for Alaska fish regardless of where fish are caught. The Forest Service should require pre-emptory booming of fuel deliveries due to these concerns. Also, the size of on-land fuel storage should be required to be increased to decrease the fuel delivery frequency, thus decreasing the probability of a catastrophic spill during delivery. 26-16

Thank you for the opportunity to provide comments on the proposed project.

Sincerely,

Dick Farnell

Dick Farnell
Acting President

cc: Gretchen Keiser, CBJ

Response to Comment 26-14

Section 2.3.10 of the Final SEIS has been modified to reflect the use of chlorine for water supply treatment under all alternatives. The exact volumes have not been determined; however, the amount of chlorine used for water treatment would be minimal compared to the 4 to 5 tons per day needed for alkaline chlorination/cyanide destruction under Alternative A.

Response to Comment 26-15

Sections 4.4, 4.6, and 4.7 of the Final SEIS evaluates the potential impacts of the project on aquatic resources, including wastewater discharges, sedimentation, and accidental spills. Section 3.9.3 of the Final SEIS presents data on commercial salmon harvests in upper Lynn Canal (1985–1995), although the value of the harvests are not included. Section 3.9.3 also has been modified to include recent information on the 1996 drift gillnet fishery in Lynn Canal. Also, please see the response to Comment 5-4.

The mine drainage treatment system is based on proven technologies for metals removal. With proper construction and maintenance, the risk of system failure is very low. The Final SEIS and the *Technical Resource Document for Water Resources* (SAIC, 1997a) document the conservative/worst-case approach that was used in projecting treated and untreated discharge quality.

Response to Comment 26-16

Please see the response to Comment 18-26.

April 2, 1997

Roger Birk
EIS Team Leader
8565 Old Dairy Road
Juneau, Alaska 99801

Dear Roger,

This letter is in support of the Kensington Mine Project. This project has been studied extensively and changed to meet the concerns expressed by many community groups. The Kensington Mine Project is sound and Coeur has demonstrated its commitment to the environment and our community. I believe the regulatory agencies involved should stay on schedule and not extend the public comment period. I believe we should permit the project and I support the mine for the following reasons:

Since 1989 Coeur has monitored and studied salmon migration and escapement in Sherman Creek. The total dissolved solids (TDS) has been the same value during that period and will remain at that same value during mine operations under the site specific criteria requested by the company. There has been no effect on fish populations or their migration. 27-1

Reclamation - The proposal outlined by the Army Corps of Engineers in the public notice is supportable, in that it combines sound reclamation and wetland mitigation principles. The Corps interpretation that compensatory mitigation is not required and that the reclamation proposed will enhance diversified wildlife habitat at the Kensingtion Mine site is correct. 27-2

Sincerely,

Danny Pruhs

cc. Ben Cope
Victor Ross

Response to Comment 27-1

Please see the response to Comment 4-5.

Response to Comment 27-2

Please see the response to Comment 18-13.

JOHN A. SANDOR, Box 21135, Juneau, AK 99802-1135; jsandor@ptialaska.net
Phone (907) 586-2497; Fax (907) 586-2490

April 2, 1997

TO Roger Birk, Juneau Ranger District, Tongass National Forest
U.S. Department of Agriculture

FROM John A. Sandor, Juneau resident

SUBJECT April 7, 1997 meeting on the Kensington Gold Project and DSEIS

I will be traveling within and outside the state, so will be unable to attend a number of your planned meetings However, I want to go on record in support of the Kensington Gold Project and the efforts Coeur Alaska has made to be responsive to issues and concerns raised in earlier phases and studies related to this Project.

For example, the initial Kensington Mine plan called for a wet tailings facility and dam. However, in response to questions and concerns raised about the wet tailings and dam, Coeur modified the plan to include dry tailings and a sophisticated monitoring system to deal with possible saturation problems. During an earlier meeting on this project, it was suggested that a berm ought to be required even if a monitoring system indicated there were no saturation problems It would seem more reasonable to evaluate monitoring results before imposing requirements which may not be needed 28-1

I would also urge the various federal, state and local government agencies work in partnership with each other and Couer Alaska to implement and build upon the improvements already made in the project During 1990-1994, U S., Alaska and local governments developed a number of cooperative agreements and partnerships to develop projects and improve the environment. A number of other states have very effective partnerships and cooperative agreements with the private sector regarding project development and environmental monitoring and audit programs In fact, the current session of the Alaska Legislature is considering legislation which promotes the protection of Alaska's environment through "Business-Government Partnerships" President Clinton's Executive Order on Inter-governmental Partnerships also endorses a partnership approach to protecting the environment. 28-2

It is time to move forward with the Kensington Project, and to promote partnerships between the various levels of government and the private sector which will improve the economy and protect the environment. Thank you for the opportunity to comment.

FILE KNSUTNI

Apr-03-97 08:01A John A. Sandor 907 586 2490 P.01

RESPONSES TO COMMENTS
Commentor No. 28: John A. Sandor

Response to Comment 28-1

Please see the response to Comment 3-1.

Response to Comment 28-2

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

SCOTT V. SPICKLER

10754 Horizon Drive
Juneau, AK 99801

Home: **(907) 586-4718**
Business: **(907) 789-3780**
Fax: **(907) 789-9800**

April 2, 1997

Roger Birk, EIS Teem Leader
Juneeu Ranger District
8465 Old Deiry Road
Juneau, AK 99801

RECEIVED
APR 03 1997
Juneau Ranger District

Deer Mr. Birk:

I would like to voice my support for the Kensington Mine Project.

I believe Couer hes been extremely responsive to the issues and concerns surrounding their project, raised by the environmental community.

Southeast Aleska needs the jobs this mine will provide. Couer's willingness to build the mine with minimal impacts to the environment is evident with the reseerch end studies done to date. For exemple, they have studied the salmon stocks in Sherman Creek for eight yeers and heve determined there will be no negative impacts from the mine operation.

The Kensington and the reguletory agencies should stay on schedule end approve the permits to allow this project to proceed without further delays. 29-1

Sincerely,

Scott V. Spickler
10754 Horizon Drive
Juneau, AK 99801

c: Ben Copy US EPA, Region 10
Victor Ross, Army Corps of Engineers

RESPONSES TO COMMENTS
Commentor No. 29: Scott V. Spickler

Response to Comment 29-1

Thank you for your comment. Sections 4.6 and 4.7 of the Final SEIS discuss the potential impacts to marine and fresh water aquatic resources.

April 3, 1997

Roger Birk, EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, Alaska 99801

RE: Kensington Mine Project Draft Supplemental Environmental Impact Statement

Dear Mr. Birk:

Klukwan, Inc. is a village corporation formed pursuant to the Alaska Native Claims Settlement Act for the benefit of the Alaska Native people of Klukwan, in upper Lynn Canal. Fifty five percent of our 325 shareholders reside in Haines, Klukwan, Juneau and other northern Southeast Alaska communities and many of our shareholders and their family members are involved in the Lynn Canal fishery.

Klukwan, Inc. supports permitting of the Kensington Project as proposed by Coeur Alaska, Inc. The project is environmentally sound because it has been studied and changed in response to concerns expressed by numerous Lynn Canal community groups.

Over the past three years Coeur has conferred extensively with local interest and resource user groups (including Klukwan, Inc. and its shareholders, the Haines Borough, City of Haines, Haines Chamber of Commerce, other members of the business community and a variety of fisheries and other community organizations), concerning their plans to develop the Kensington Mine in a manner that is environmentally and socially acceptable to the Lynn Canal community. 30-1

More specifically, Coeur has made concerted and specific efforts to consult with Haines based fishermen regarding mine discharge, water treatment and tailings disposal issues. In the course of this effort Coeur has;

- Changed their original and permittable mining plan out of respect for the concerns raised by the local fishery interests and other resource user groups in order to avoid a direct discharge into Lynn Canal; and
- Had tests independently conducted that show no harm will occur to human or aquatic life from the revised total water quality management plan; and
- Proposed a prudent dry tailings facility with a complete contingency plan for monitoring; and

KLUKWAN, INC.
P.O. BOX 32077 · JUNEAU, ALASKA 99803-2077 · (907) 789-7361

RESPONSES TO COMMENTS
Commentor No. 30: Klukwan, Inc., Don Argetsinger

Response to Comment 30-1

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

- Coeur has committed to backfilling at least 25% of the tailings with a provision to increase this percentage as doing so becomes technically and economically feasible.

The remote location and nature of the Kensington Project will not necessarily cause other major projects to be built or proposed for the vicinity. Accordingly, there are no reasonably forseeable cumulative impacts that will result from the mine.

Reclamation proposals as outlined by the Corps of Engineers in the public notice are reasonable and supportable in that compensatory mitigation is not required and the reclamation proposed will ultimately enhance diversified wildlife habitat at the site.

In our opinion, a review of the 1992 Final Environmental Impact Statement shows that subsistence and cultural resource issues were adequately addressed. Even so, Coeur has continued its information gathering efforts for the DSEIS and no significant changes of findings appear to be warranted. 30-1 (cont.)

We believe Coeur's method of consultation and cooperation with affected local parties should be a model for resource industries and interest groups across the state. This process has resulted in a project that is not only environmentally sound, but acceptable to the Lynn Canal community of resource user groups. As a result, Klukwan, Inc. is satisfied with the commitment Coeur Alaska has demonstrated to the environment and people of Southeast Alaska.

Klukwan, Inc. supports the timely and expeditious permitting of the Kensington Mine Project.

Sincerely,

KLUKWAN, INC.

Don Argetsinger, President

cc: Ben Cope, USEPA
Victor Ross, COE
Sharmon Stambaugh, ADEC
Goldbelt, Inc.
Kake Tribal Corporation
Coeur Alaska, Inc.
City and Borough of Juneau

April 3, 1997

Roger Birk, Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, Alaska 99801

Subject: Kensington DSEIS comments

Dear Mr. Birk:

I wish to comment in favor of your approval of the Kensington Mine Project. It has received an unusually extensive amount of study, and Coeur Alaska Inc. Has been very responsive to the concerns of the community of Juneau and the region. Coeur has demonstrated its commitment to responsible environmental stewardship and sensitivity to community values and concerns. I urge you to approve the project.

I would like to provide additional comment in support of Coeur's's dry tailings disposal plans. From first hand experience I can vouch for problems that occur from over engineering and providing too much redundancy to potential problems. Solutions can oftentimes become the problem. Coeur has completed state of the art engineering and modeling for the disposal of dry tailings. They are ready to take additional steps if monitoring warrants it. This approach is both prudent and cost effective. Requiring them to modify these plans solely to provide a larger margin of safety is not appropriate. If there are concerns still remaining then they should be addressed by appropriate monitoring rather than redundant engineering. 31-1

Thank you for providing the opportunity to make these comments.

Sincerely,

Paul C. Rusanowski, Ph.D.
628 Basin Road
Juneau, Alaska 99801

RESPONSES TO COMMENTS
Commentor No. 31: Paul C. Rusanowski, Ph.D.

Response to Comment 31-1

Please see the response to Comment 3-1.

STATE OF ALASKA

TONY KNOWLES, GOVERNOR

OFFICE OF THE GOVERNOR

OFFICE OF MANAGEMENT AND BUDGET
DIVISION OF GOVERNMENTAL COORDINATION

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April 4, 1997

RECEIVED

Mr. Roger Birk
USDA, Forest Service
Juneau Ranger District
8465 Old Dairy Road
Juneau, AK 99801

Re: Kensington Gold Project Draft Supplemental Impact Statement AK 9702-18PA

Dear Mr. Birk:

Comments from the Alaska Departments of Fish and Game, Natural Resources, Commerce and Economic Development, and Environmental Conservation on the Kensington Gold Project Draft Supplemental Impact Statement (DSEIS) are provided herein for your consideration. The State will issue a separate Consistency Determination through review AK 9702-17PA.

Comments Received From ADFG

- 4.6 Aquatic Resources (Marine) - Construction of a Marine Terminal: *The construction of the marine terminal would require dredging a portion of Comet Beach in the immediate vicinity of the barge landing area. (p.4-47, para 6)* ADF&G will coordinate with the U.S. Forest Service (USFS) to identify critical periods for marine fish habitat (i.e. salmonid outmigrants utilizing nearshore habitats for rearing) in the Comet Beach area, in order to minimize impacts during inwater construction activities. In general, marine inwater work will be allowed to occur from approximately late June through late March. 32-1

- 4.7 Aquatic Resources -- Fresh Water. Diversion of Ophir Creek into Ivanhoe Creek: *A worst-case assessment of 125 to 170 Dolly Varden could be lost directly because of the Ophir Creek diversion. (p.4-53, para 1)* ADF&G recommends that prior to the diversion of Ophir Creek, most Dolly Varden be driven out of Ophir Creek with pole seines, or another appropriate tool; or trapped and moved to Ivanhoe Creek. Though not mentioned in the DSEIS, the operator proposes to armor approximately 32-2

01-A35LH

RESPONSES TO COMMENTS
Commentor No. 32: State of Alaska, Office of the Governor, Rex Blazer

Response to Comment 32-1

Please see the response to Comment 18-32.

Response to Comment 32-2

Removal of Dolly Varden char prior to diverting Ophir Creek is feasible and could be appropriate. BPJ indicates that rearing habitat is the limiting factor within the system and that habitat were saturated, displacing char to another portion of the system could increase the density in that reach beyond the carrying capacity and result in a similar loss of fish over time. If the number of fish were small, the displacement could work fine. The current estimate of potential loss to the population is based on densities lower in the system and could overestimate the actual densities. Section 4.3.2 of the Final SEIS has been modified to indicate that 300 feet of channel would be armored with riprap to mitigate for scouring below the Ophir Creek diversion. This section also discusses the incorporation of large woody debris as a mitigation BMP, which could be required by the Forest Service.

300 feet of streambank along Ivanhoe Creek with riprap, immediately downstream of the confluence of the Ophir Creek diversion. This action is deemed necessary to protect Ivanhoe Creek from additional water flow due to the addition of Ophir Creek water. ADF&G recommends that large woody debris (LWD) including root wads and vegetation, be considered for incorporation into the streambed stabilization design. In addition to providing overhanging vegetation and instream LWD for fish habitat for the duration of the mine, restoration following mine closure should be easier to accomplish. ADF&G has design information it will be glad to provide, that has been successfully used in a wide variety of locations, such as the Kenai River and many waterways in King County, Washington. 32-2 (cont.)

- Avalanche paths and their potential impacts must be clearly delineated, especially relative to the Ophir Creek diversion. The probability of a destructive avalanche and the resulting consequences should be clearly determined for the selected location of the diversion. 32-3

- Five Stream Crossings Required By The Haul Road: *All road construction activities would be timed to avoid critical periods for anadromous fish. (p.4-53, para 3)* ADF&G will coordinate with the USFS to identify critical periods for anadromous fish in Sherman Creek, in order to minimize impacts during inwater construction activities. Spawning salmon will be present from late summer into the fall, eggs will be incubating in the gravels of lower Sherman Creek until outmigration begins in April, which lasts until early summer. In general, aquatic inwater work is allowed to occur from approximately early June through early August. 32-4

- Conduit Stream Crossings of Upper Sherman Creek and Ivanhoe Creek: *Two road crossings would be required on upper Sherman Creek, totaling 380 and 300 feet, respectively. In addition, one road crossing would be required on Ivanhoe Creek, totaling 200 feet (p.4-53, para 6)* ADF&G appreciates that bottomless conduits have been proposed for these crossings. These structures will minimize fish passage concerns and allow for easier post-project reclamation. The proposed length of two of these conduits has been reduced, which will further minimize impacts to resident fish habitat. 32-5

The primary concern with structures of this type is that the footings must be protected from scour during high-water events. Sections of upper Sherman and Ivanhoe Creeks which are meandering will be confined within the conduits, channelizing the streambed. This may cause the channels to degrade and promote down cutting, which could lead to scouring of the footings. The final engineering design for these conduits will require close scrutiny to avoid additional inwater work. However, some operation and maintenance (O&M) will likely be required to maintain fish passage after high 32-6

Response to Comment 32-3

Sections 4.2.2 and 4.2.3 of the Final SEIS have been modified to describe the potential impacts from avalanches under Alternatives A through D. In addition, these sections discuss the potential impacts to mining facilities and relevant mitigation measures.

Response to Comment 32-4

According to Section 2.5.1 of the Final SEIS, the operator is required to coordinate with the Forest Service and ADF&G on schedules for construction activities in Sherman Creek.

Response to Comment 32-5

Please see the response to Comment 5-2.

Response to Comment 32-6

The selected alternative in the Forest Service Record of Decision includes bridges rather than bottomless conduits. The bridges would virtually eliminate concerns regarding sedimentation and scouring at the road crossings.

water events. We recommend that USFS oversee regular O&M of these structures to ensure that fish passage and habitat conditions do not deteriorate. Channelizing of the streambed could remove the drop/pool characteristics that provide resting habitat and promote fish passage in sections of these streams. We recommend that large woody debris that is lost as a result of the project be replaced by strategically replacing large wood or, less desirably, large boulders into the channel. 32-6 (cont.)

- Water Withdrawal: *Water withdrawal under Alternatives B through D would require approximately 0.52 cfs from upper Sherman Creek during periods of non-critical flow. (p.4-54, para 3)* The plans submitted by the operator for the infiltration gallery indicate that impacts to fish resources such as impingement, will be minimal or nonexistent. As stated, intermittent low flows may preclude water withdrawal during certain times of the year. The operator's water storage system must be designed to provide adequate water storage for this eventuality. We would like to see additional treatment of this topic in the FSEIS Additionally, a low-flow operating plan should be developed that will list steps to be taken by the operator as Sherman Creek flows approach the low-flow limits imposed on the Permit to Appropriate Water. 32-7

- Reclamation Plan- Stream Bank and Drainage Restoration: The Reclamation Plan proposes using only riprap for stabilizing stream banks and drainage courses after project closure. Other methods incorporating large woody debris and live vegetation will promote better fish habitat and restore the area to a more natural condition. ADF&G would appreciate being consulted prior to any streambank restoration work. 32-8

- Cumulative Effects: The cumulative effects of this and other projects planned for the Lynn Canal/Berners Bay area are not adequately discussed. When defining cumulative effects on broad actions the proposals must be considered geographically, including actions occurring in the same general location, such as a body of water or region. Cumulative effects (or impacts) are effects on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertake such other actions. These effects can result from individually minor but collectively significant actions taking place over a period of time. A section dedicated to cumulative effects would present a clearer picture than the present piecemeal approach. The effects of related projects such as the Jualin Mine, Lace River Hydro and Goldbelt's Echo Cove development must be taken into account along with unrelated projects such as the Juneau Access Project. The effects from increased air traffic, boat traffic, sewage runoff, waterfront development and hydrocarbon pollution from these projects must be presented in such a way that decisions can be made knowing the cumulative effects of the Kensington Gold Project and other geographically related projects. 32-9

Response to Comment 32-7

The operator has proposed to use mine drainage to supplement water supply. Sections 4.3.1 and 4.3.2 of the Final SEIS have been modified to clarify this statement.

Response to Comment 32-8

Thank you for your comment. The use of large woody debris has been included as a mitigation measure, as discussed in Section 2.5.1 of the Final SEIS.

Response to Comment 32-9

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

As an example, the Auke Bay area is an analogous situation where development has coincided with the decline of marine fishery resources. The precipitous decline of the Lynn Canal/Juneau herring stock, a primary food sourcc for many species of fish and wildlife, is a prime example of how cumulative effects can lead to the demise of a fishery. ADF&G believes a primary reason for the decreased herring production in the Auke Bay area is increased waterfront development, boat traffic, and the oil, gas, and sewage pollution from within Auke Bay. Traditionally in the 1950's most of the herring spawning in the local area occurred in Auke Bay and Auk Nu Cove. The limited amount of herring spawning that now occurs locally is centralized in the Berners Bay area. This Lynn Canal/Juneau stock has been far below the threshold spawning biomass necessary to conduct a commercial fishery since 1982. If herring are now displaced from the Berners Bay area, which may happen given the scope of projects planned for this area, the result could be virtual elimination of this herring stock. The consequences of this likelihood, for the sport and commercial fishing resources and industries in the Lynn Canal/Juneau area must be considered. Additionally the cumulative and secondary impacts of this and other planned development in the area to salmonids, marine mammals, mountain goats and other wildlife species must also be considered. 32-10

Comments Received From ADNR

- Summary/Affected Environment, p.x: The third and fourth bullets in this section omit mention of revised low flow estimates, and seem to imply that the hydrologic characteristics are as they were portrayed in the FEIS with the exception of storm events. The summary should acknowledge that improved hydrologic analysis since the FEIS has resulted in reduced estimates of annual low flow events, and a monthly distribution of flows in Sherman Creek that is higher for the winter months and lower for the summer months than the USGS statistics reported in the FEIS. 32-11

- Summary/Environmental Consequences/Surface Water Hydrology, p. xi: The first paragraph, 4th sentence can be read to imply that there would be no mine drainage at all under Alternatives A or C. It should conclude, "... by eliminating the existing mine drainage discharge into Sherman Creek." The second paragraph of this section dealing with stream divcrsions appears to use a definition of "diversion" that excludes withdrawal of water or other partial diversions of flow; this makes the sentence, "Under Alternatives B through D, Sherman Creek would not be diverted", confusing. Certainly some of the flow of Sherman Creek will be divcrted by the infiltration gallery for various uses. It also appears that the routing of upper Sherman Creek around the process area may divert its channel somewhat (see p.4-20.) 32-12

Response to Comment 32-10

Please see the response to Comment 32-9.

Response to Comment 32-11

The Summary of the Final SEIS has been modified to reflect that modeling produced both high and low characteristic flows.

Response to Comment 32-12

Section 3.5 of the Final SEIS discusses the discharge of mine drainage under the current baseline conditions. This discharge would not occur under Alternatives A and C. Technically, a withdrawal of water can be considered a diversion. The Final SEIS, however, is consistent and clear when referring to the location, quantity, and potential impacts associated with both water withdrawals and discharges. The Final SEIS was not changed.

- Affected Environment/Ground Water Hydrology, 3.7.1, p. 3-17: It would be helpful if the surface expression (if any) and underground orientation of the "northwest-southeast oriented fracture system" identified as the source of the majority of the mine groundwater were shown on a map and section. 32-13

- Environmental Consequences/Surface Water Hydrology/Alt. A/Water Withdrawals and Discharges, p. 4-18: The last paragraph in this subsection deals with mine drainage and the fact that discharging it into the marine discharge eliminates it as a contribution to Sherman Creek flow. However, the subsection uses the current range of mine discharge flows only, and does not deal with the increased mine discharge flow expected at full mine development. (Compare with treatment of Alt. B, p. 4-22.) 32-14

- Env. Consequences/Surface Water Hydrology/4.3.2 Effects Common to Alts B thru D/Water Withdrawals and Discharges, p. 4-19: 1st para., 1st sentence calls this water "potable water", suggesting it is for drinking &/or domestic use. The stated amounts approximate those applied for in the water right application for water from Sherman Creek for all uses: camp domestic water 20,000 gpd, mill processing 288,000 gpd, drilling 44,000 gpd, and dust control 10,000 gpd; total 362,000 gpd or 251 gpm or 0.56 cfs. The point is that this water use should not be described as "potable water". 32-15

- 4.3.3, p. 4-22: Characterization of the mine drainage return flows as net increases to surface flow or flow augmentations should be consistent with the characterization of the affected (groundwater) environment in subsection 3.7.1. Note that the FEIS characterized "major parts of the streams" in the Sherman Cr. basin as having "a gaining character" with respect to groundwater (p. 3-19), and stated that "Along the monitored section of Sherman Creek, ground water from the till and bedrock discharges into the stream throughout the year." 32-16

- 4.5, p. 4-39: [2nd para.] Does the sentence "This flux of ground water into the mine . . . by creating a small drawdown in the ground water table" refer to groundwater above the mine workings in the fracture system referred to in 3.7.1? Again, a map/section would be helpful. 32-17

- 4.5.2, p. 4-41: 2nd sentence in para. under Ground Water Hydrology/Mine Workings, "The development of the mine and the mine workings are not expected to affect the ground water hydrology in the Sherman Creek basin" is not consistent with the explanation of increased mine drainage (ground water interception) at full mine development in 4.3.3. 32-18

- 4.7.2, p. 4-54 [Water Withdrawal]: The mention of December, January, and February as months in which restrictions on water withdrawals would be likely omits March, which 32-19

Response to Comment 32-13

The 1992 FEIS presents thorough discussions of the geology, geologic units and hydrogeologic units in the Sherman Creek basin. The 1992 FEIS also provides a potentiometric surface map. The objective of the SEIS is to supplement this information, primarily providing results of recent characterization work in the Terrace Area drainage basin, which has been proposed for the DTF site. An additional map has not been included in the Final SEIS.

Response to Comment 32-14

The Draft SEIS is correct. Under current conditions, 100 to 400 gpm of mine drainage discharges to Ophir Creek. Under Alternatives A and C, all mine drainage would be discharged to Lynn Canal, regardless of the amount, but the change from current conditions would only be a reduction of 100 to 400 gpm.

Response to Comment 32-15

The word "potable" has been deleted from Section 4.3.2 of the Final SEIS.

Response to Comment 32-16

As reported in the 1992 FEIS, the Sherman Creek basin has a complex hydrogeology, comprising at least five geologic units that make up three separate hydrogeologic units. Although most of Sherman Creek has been characterized as gaining with respect to ground water, these data suggest that not all ground water flux entering the mine could be considered a source directly contributing to surface water. Moreover, it is unlikely that the volume of mine drainage that could contribute to surface flow is significant with respect to the total discharge of ground water to surface water in the whole Sherman Creek basin. The reported "net increases" in stream flow resulting from mine water discharge reported in the Final SEIS are small, which would result in insignificant changes to average monthly flows.

Response to Comment 32-17

Yes. The drawdown of ground water or of the potentiometric surface could include these fractures. These fractures have not been identified as a significant issue. An additional map has not been included in the Final SEIS.

Response to Comment 32-18

Section 4.5.2 of the Final SEIS has been modified to be consistent with the discussion of impacts to ground water hydrology presented in Section 4.5.1.

Response to Comment 32-19

Sections 4.7.1 and 4.7.2 have been modified to indicate that instream flows could be compromised during any month. Instream flow requirements are set at different levels throughout the year, based on life stage and habitat requirements of fishes.

has a lower average flow than December. If this is due to species/life stage considerations, it should be explained; otherwise it's confusing. If the whole discussion is based only on the assumption that the months of lowest average flow are the months most likely to have withdrawal restrictions, it is likely to be erroneous and will have to be rewritten after ADF&G presents its instream flow recommendations. 32-19 (cont.)

Comments Received From ACED

In general terms, CED supports the proponents preferred alternative (alternative B) as opposed to the US Forest Service recommended Alternative (alternative D). 32-20

- Tailings Transportation:
Coeur's preferred alternative B proposes to truck dewatered tailing from the mill site near the mine portal to the dry tailing disposal facility (DTF) near Comet Beach. The Forest Service preferred alternative D recommends installing a slurry line from the mill site to the vicinity of the DTF in lieu of trucking. It appears the main reasons for the Forest Service proposal are to (1), limit truck traffic, and (2), concern over the magnitude of any tailing spill and the potential for such spill to enter Sherman Creek. 32-21

It is not clear from the SEIS what benefits are derived from a tailing slurry transportation as opposed to trucking of tailing to the DTF. The Forest Service cites the potential for a spill from a trucking operation along with the increase in fuel usage (along with greater potential fuel spillage) as reasons for an alternative to the use of haul trucks. However, a slurry line also has potential for failure and discharge of tailing. Although a slurry line would cut down on truck traffic from the portal to the DTF, it's use would necessitate the construction of a separate tailing dewatering facility at the DTF complete with power and building requirements thus enlarging the overall project footprint by 18 acres. Also, it appears the SEIS does not factor in the power requirements (and associated fuel storage- transport- and burn) required for a tailing dewatering facility separate from the mine mill. In addition, the spill potential, increased footprint, and operational parameters for the decant return line to the mill facility from the required dewatering facility at the DTF must be clearly evaluated relative to the applicants proposal. 32-22

The point is that both tailing transport options have merits and disadvantages. Given that both slurry and trucking options are viable, CED urges that project economics be the deciding factor. Ultimately, when the risk trade offs are similar in various project components the one which maximizes project economics should be favored since this is what maximizes resource utilization. 32-23

Response to Comment 32-20

Thank you for your comment. The Forest Service Record of Decision provides the rationale for the selected alternative.

Response to Comment 32-21

The Final SEIS documents the comparative impacts associated with trucking dry tailings to the DTF versus piping tailings slurry to dewatering facilities at the DTF. This includes an analysis of the predicted frequency and magnitude of spill events. As discussed in the Final SEIS, power requirements for dewatering facilities at the DTF would be met by the generators at the process area via underground lines. The power requirements under Alternative D would be similar to those under Alternatives B and C. The Forest Service Record of Decision provides a more detailed discussion of the selected alternative and the rationale for selecting the tailings transport method.

Response to Comment 32-22

Please see the response to Comment 32-21.

Response to Comment 32-23

Thank you for your comment. The Forest Service Record of Decision provides the rationale for the selected alternative.

- Tailing Disposal Facility:

Coeur proposes to construct the DTF in designed cells with impervious caps placed at various intervals. The overall facility would incorporate water treatment structures, diversions, monitoring wells, and ultimate reclamation. The necessity for the addition of an "Engineered Structural Berm" as laid out in the preferred Alternative D is unclear. One of the main reasons for going to dry tailing disposal at Kensington is to not have to build and maintain a costly tailing dam. Alternative D would require an additional costly structure without a clear analysis relative to its necessity. Dry tailing disposal without the requirement of an "Engineered Structural Berm" is currently being used at the Greens Creek mine. Dry tail and waste rock facilities seem to be operating per design and reclamation parameters in the Hawk Inlet area for the Greens Creek mine. Although there are differences between the two projects a comparison is most instructive. 32-24

Greens Creek is a massive sulfide mine with high acid generating potential along with heavy metal loading. Kensington is a high carbonate low sulfide gold deposit with net acid neutralization and low metal loading potential. Greens Creek ores are ground to very fine powder consistency with the grinding at Kensington more similar to fine sand. This allows for much better drainage of Kensington tailing than Greens Creek tailing. Another important comparison is the amount of annual precipitation at the relative sites. Annual precipitation at the Kensington DTF is estimated in the SEIS to be between that at the 800 adit (58.3 inches) and for the Eldred Rock station (47 inches). Annual precipitation for the Greens Creek disposal sites are 85 inches at the mine (waste rock disposal sites) and estimated to be over 60 inches at the Hawk Inlet site. 32-25

The point to draw from these comparisons is that in every instance Kensington offers a superior site and tailing character for dry disposal than Greens Creek. Nevertheless, the Forest Service allows dry disposal in the Greens Creek area without an Engineered Structural Berm as recommended for Kensington.

Through adequate monitoring ample time is available to redesign and remedy any adverse conditions which may develop if, in a worst-case scenario, the DTF were to exhibit structural and stability problems. Such contingencies could include additional compaction and various capping and drainage systems such as dewatering wells. Only as a final fallback should the construction of a structural berm or similar containment system be required. The Forest Service should require suitable DTF monitoring during is development and operation rather than default to an expensive and likely unnecessary structural berm. 32-26

Response to Comment 32-24

The entire DTF at Greens Creek is an engineered berm because the entire pile is compacted. This compaction ensures stability, even under saturation conditions. The tailings material at the Kensington Gold Project site would provide better drainage than at Greens Creek. The proposed design for the Kensington Gold Project relies on drainage to prevent saturation and assure stability. Also, please see the response to Comment 3-1.

Response to Comment 32-25

Please see the response to Comment 32-24.

Response to Comment 32-26

Please see the response to Comment 3-1. The Forest Service Record of Decision provides the rationale for the selected alternative.

Comments Received From ADEC

Water Quality

- NPDES Permit: DEC will be commenting separately on the Environmental Protection Agency on the NPDES discharge permit. Also, our 401 certification of that permit will contain stipulations regarding monitoring and other best management practices. Groundwater monitoring at the dry tailings facility (DTF) will be included in the DEC Solid Waste permit. DEC's 401 certification of the Army COE permit will have stipulations for maintaining water quality during construction. 32-27

- Page 1-5, last bullet, states that "site specific variances should not be granted for mixing zones." DEC clarifies that the state has separate regulations for short term variances, site specific criteria and mixing zones. The developer has not requested a mixing zone from DEC but has requested site specific criteria for total dissolved solids (TDS) and sulfate under 18 AAC 70.025. 32-28

- Page 2-6, section 2.2.3, Alternative C - Marine Discharge states that under this alternative, process area runoff would be collected in a settling pond and discharged to upper Sherman Creek. DEC notes that in addition to a marine discharge permit, this alternative would require either an additional NPDES discharge point or a DEC industrial wastewater discharge permit. 32-29

- Table 2-2 lists DEC as the responsible party for monitoring spawning gravel composition and embryo survival. Although DEC water quality standards ensure protection of aquatic resources, the agency does not typically monitor spawning gravel. The Alaska Department of Fish and Game should be consulted. 32-30

Air Quality

- There are minor differences in the amount of fugitive emissions from Alternative B and D. Hauling tailings in Alternative B versus slurry piping them in Alternative D will not greatly impact air quality. A bigger impact could be road runoff with the trucking alternative. 32-31

- Most of the discussion in the SEIS on air quality is consistent with Kensington's Air Quality permit application. However, the SO_2 emission estimates are based on a fuel sulfur content lower than that requested by the applicant December 4, 1996. Therefore, the tables in Section 4.1 should be updated with revised SO_2 emission rates and impacts on ambient standards and increments. 32-32

Solid Waste

- Saturation of tailings must be prevented with the dry tailings facility (DTF) design. DEC will be reviewing operations and maintenance plans for how the developer will manage the tailings to 32-33

Response to Comment 32-27

Thank you for your comment.

Response to Comment 32-28

Section 1.5 of the Final SEIS has been clarified to indicate that no site-specific variances have been requested for the project. In addition, although the operator has received site-specific criteria for TDS and sulfate in Sherman and Camp Creeks, the operator has not requested a fresh water mixing zone.

Response to Comment 32-29

Section 2.2.3 of the Final FEIS has been modified to clarify that marine discharges would have to be addressed by the NPDES permit, including requiring a mixing zone application as necessary to comply with NPDES permit limits.

Response to Comment 32-30

Table 2-3 in the Final SEIS has been corrected accordingly.

Response to Comment 32-31

Section 4.1 of the Final SEIS indicates that air quality emissions from Alternatives B through D are comparable. The Final SEIS also indicates that greater road traffic from hauling tailings under Alternatives B and C could lead to more erosion. However, proper use of BMPs should minimize sediment loadings from the road to surface water under all alternatives.

Response to Comment 32-32

Tables 4-8 and 4-11 in the Draft SEIS list SO_2 point source emissions of 107.05 tons per year for Alternatives B, C, and D. The total SO_2 emissions for these alternatives should be 156.12 tons per year. Tables 4-8 and 4-11, as well as Table 4-12, have been corrected in the Final SEIS.

Response to Comment 32-33

Monitoring saturation and drain performance would be included in the final Plan of Operations and in the solid waste permit, which would be administered by ADEC.

avoid saturation. As the tailings compress under their own weight, the pore space will shrink, forcing the pile toward saturation even without the anticipated small amounts of added water from precipitation and possibly inflow (<10"/year). This means the DTF must have functional piezometers, functional base drains, and careful monitoring of all internal drains for volumes of water coming from the interior of the pile and the final disposition of that water, if any, after it exits those drains. The DEC Solid Waste permit will be carrying reporting requirements for this monitoring. 32-33 (cont.)

The SAIC technical report on the DTF emphasized the base drains as being important. Section 5.1 of that report stated: "The most significant technical issue is the requirement to keep the outer zones of the pile unsaturated to prevent liquefaction under seismic loading." Under certain conditions, smaller seismic events, and even vibrations from heavy equipment, might tend to liquefy saturated tailings in vulnerable areas of the DTF. Again, DEC will be looking to the developers operations and maintenance plans for preventive measures for avoiding liquefaction. 32-34

- DEC questions that only six inches of soil is sufficient to hold and sustain good vegetative cover or to shunt runoff safely away from the DTF without episodes of excessive erosion or "skin flows". The DEC solid waste permit section on closure and the reclamation plan may need to address this issue. 32-35

- Also the drainage pattern below the DTF, and where the outside diversion ditches ultimately will discharge their water are of concern. We will expect the plan of operations to include contingency plan for events that could contaminate the water in these ditches, either with chemicals (from a spill, e.g.) or with excessive solids (like from heavy runoff events.) 32-36

- DEC's Solid Waste permit will not require the berm featured in Alternative D at this time. We understand that the developer will be carefully monitoring the first constructed cell of the DTF for about three years post construction for stability problems. After reviewing the piezometer data and performance of the drains, the developer and agencies may determine that the buttress will be needed. DEC will expect assurances in our permit that retrofitting the DTF with a berm/buttress will be adequate to bring the pile into a permanently stable configuration. 32-37

Spill Contingency Plan

- Page vii lists the permits required for this project. The list of federal permits should include the Facility Response Plan, required by the U.S. Coast Guard under the Oil Pollution Act of 1990. Under state permits, the SEIS should list the Oil Discharge Prevention and Contingency Plan, required by DEC. 32-38

- Table 2-2 may want to include a section on protection of near shore marine waters from fuel spills. The DEC Contingency Plan is the authority, with Coeur and DEC as the responsible parties. 32-39

- Page 4-84 analyzes the risk of petroleum spills at the Kensington Mine. Coeur's analysis 32-40

Response to Comment 32-34

The DTF is designed to minimize infiltration and avoid tailings saturation. Extensive monitoring would be performed to detect any saturation before it could lead to liquefaction and DTF failure.

Response to Comment 32-35

The operator has indicated that soil would be placed at depths of 1 to 2 feet where practical, which should allow adequate root development. Section 2.5 of the Final SEIS indicates that the operator would be required to apply a minimum depth of 1 foot of plant growth material on all areas to be revegetated. The Reclamation Plan would also be required to include a map indicating areas that would be revegetated, along with proposed seed mixes. In addition, the operator would conduct concurrent reclamation on each cell (and of partially constructed cells) of the DTF. The reclamation/revegetation would be monitored relatively early in the reclamation process to determine whether the erosion control practices and revegetation efforts were successful.

Response to Comment 32-36

Section 4.3.2 of the Final SEIS has been modified to clarify the discharge points for the run-on diversions around the DTF. Except for non-toxic polymers for water treatment, no appreciable volumes of chemicals would be used at the DTF. Therefore, chemical contamination of the diversions is considered unlikely. The C-Plan approved by ADEC provides the operator's approach to responding to any chemical spills at the site. Because the outer diversions would only be used to manage runoff from undisturbed areas, sediment loadings in these channels should generally be consistent with natural conditions during storm events.

Response to Comment 32-37

Under Alternatives B and D, the DTF design would be modified to provide necessary structural controls if widespread saturation were detected in the unit.

Response to Comment 32-38

Section 1.6 of the Final SEIS indicates that the Facility Response Plan (FRP) must be submitted to EPA, not the Coast Guard. This section also notes that ADEC requires an Oil Discharge Prevention and Contingency Plan (C-Plan).

Response to Comment 32-39

Table 2-3 of the Final SEIS has been revised to include post-spill monitoring in nearshore waters, as required by the C-Plan.

Response to Comment 32-40

Section 4.12 of the Final SEIS has been modified to include the existing throughput volume of 42.5 million gallons. Under Alternative A, diesel transportation would increase by 5 percent. Under Alternatives B through D, about 15 percent more diesel would be transported.

shows that the proposed annual petroleum throughput of 6.5 million gallons would be an increase of about 3.25 percent to the current volume transported in Lynn Canal. The three major oil terminals in Haines and Skagway show a combined annual throughput of approximately 42.5 million gallons, according to figures in their oil spill contingency plans. Addition of another 6.5 million gallons at the Kensington Mine represents approximately a 15 percent increase in volume of petroleum transiting Lynn Canal yearly. 32-40 (cont.)

- The sane section also discusses additional risks from the increased number of fuel transfers in the Lynn Canal area, but does not mention the percent increase in transfers. Contingency plans for the three terminals mentioned above show that they perform approximately 85 petroleum transfers yearly. The 52 weekly deliveries planned by Coeur would amount to approximately a 61 percent increase in the number of fuel transfers for the area. It should also be noted in this section that Coeur's deliveries would be made via floating hose from a moored barge, whereas the other terminals take their deliveries via the less risky fixed piping on permanent docks. 32-41

- DEC would like the Final EIS to include estimates of the value of the gillnet fishery at Pt. Sherman, including annual commercial harvest revenue and number of subsistence users (especially from Haines) of the resource. This has been a topic at many of the water quality hearings and discussions with fishers the agency has had. 32-42

- The statement below appeared in DEC's scoping comments on the project last year: *Some information on project changes has focused on housing and transporting workers from Echo Cove at the end of the Juneau road system.* Although Coeur has not confirmed that this is a possibility, the SEIS should describe any potential development in that or the Bemers Bay area that could create cumulative impacts. At the public hearing, cumulative impacts were discussed at length. The Final EIS should include an analysis of the new information on the Juneau access project and the Lace River Hydro project which have become available since the SEIS was issued. 32-43

On behalf of the state agencies participating in the review and permitting processes for the Kensington Mine project, I thank you for the opportunity to provide comment. We will continue to work closely with your agency, other federal agencies, the City and Borough of Juneau, the public, and Coeur Alaska, Inc. to complete the Kensington review process. Please contact me by calling 465-8791 if you have any questions about these comments.

Sincerely,

Rex Blazer
Project Analyst

cc: distribution list

Response to Comment 32-41

Section 4.12 of the Final SEIS has been revised to include the current total transfers provided by the State of Alaska. Using 85 transfers per year, the increase in transfers would be about 14 percent under Alternative A and 61 percent under Alternatives B through D.

Response to Comment 32-42

Please see the response to Comment 26-15. Section 3.9.3 of the Final SEIS has been modified to include potential revenues.

Response to Comment 32-43

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

BARTLETT REGIONAL HOSPITAL

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April 4, 1997

Mr. Roger Birk
EIS Team Leader
U. S. Forest Service
Juneau Ranger District
8465 Old Dairy Road
Juneau, Alaska 99801

Dear Mr. Birk:

This letter is in support of the Kensington Mine project. The project has been studied, changed in response to concerns expressed by community groups, and studied again. The project is sound and Coeur has demonstrated its commitment to the environment and the community. The regulatory agencies involved should stay on schedule, not extend the public comment period, and should permit the project. 33-1

Sincerely,

Robert F. Valliant

Robert F. Valliant
Administrator

RESPONSES TO COMMENTS
Commentor No. 33: Bartlett Regional Hospital, Robert F. Valliant

Response to Comment 33-1

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

P.O. Box 118
Haines, Alaska 99827
April 5, 1997

Roger Birk, EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, Ak 99801

Dear Mr Birk,

Southeast Alaska in general and Haines in particular have been discovered. People are moving into Haines at an alarming rate. I'm sure Lynn Canal and Berner's Bay will be suffering with the problems of increased population because of the Jualin Mine, the proposed Juneau Access Road, Goldbeld Native Corporation's proposal at Echo Cove and the Lace River Hydroelectric Project. 34-1

Water is my first concern and it's affect on fish is my second. The whole Lynn Canal could become a vast mixing zone unless high water standards are maintained and monitered. High standards are worthless if exemptions are allowed, even worse is the possibility of lowering standards on economic feasibility rather than maintaining high standards for public health. 34-2

The Kensington executives think only of the corporate "bottom line" when they ask for reduced standards. For instance the Kensington had an arsenic problem which they may have solved by asking the Governor to ask the EPA to allow them to discharge arsenic at 50 micrograms per liter. The high standard had been 0.18. If all the proposed development occurs and each has a discharge of some sort, then Lynn Canal will gradually become seriously degraded. Will we then be able to market our fish? Will it be safe for us to eat local fish? Most people believe that the ADEC will maintain clean water so that we harvest healthy fish. However, just keeping high standards is not enough, monitoring is vital and fines on degraded water need to be high. 34-3

Another area of concern is the accumulation of toxics in Lynn Canal. Whenrivers are low in the winter and streams are frozen solid, the amount of water for delution is considerably less but the tidal action continues. It seems to me that the complete flushing of the canal could take longer and allow a greater consentration of contaminants than in summer. This could be serious depending on what fish are living in the canal during the winter and at what stages in their life cycles. This would be a long study and probably expensive but vital for the survival of our fishing industry and health for those of us who eat fish. 34-4

Thank you for reading my thoughts.

Sincerely yours,
Vivian Menaker
Vivian Menaker

RESPONSES TO COMMENTS
Commentor No. 34: Vivian Menaker

Response to Comment 34-1

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Response to Comment 34-2

For both outfalls 001 and 002, water quality standards would be met at the point of discharge without a mixing zone (note that these are fresh water discharges). For outfall 003, the Final SEIS indicates that the sanitary discharge would have no significant effect on Lynn Canal water quality with the mixing zone granted by the State under the 401 certification process. Also, please see the response to Comment 4-5 related to TDS.

Response to Comment 34-3

The NPDES permit includes arsenic limits consistent with ensuring compliance with the current arsenic standard of 0.18 μg/L not 50 μg/L. Also, please see the responses to Comments 4-2 and 4-4.

Response to Comment 34-4

As discussed in the response to Comment 34-2, treated mine water, process area runoff, DTF drainage, and runoff are expected to meet all applicable water quality standards at the points of discharges to Sherman Creek and Camp Creek. As documented in the Final SEIS, therefore, there should not be toxic effects on Lynn Canal under any seasonal conditions. Also, please see the response to Comment 9-2.

April 7, 1997

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JUNEAU RANGER DISTRICT

COEUR

ALASKA GROUP

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Mr. Roger Birk
United States Forest Service
Alaska Region Tongass National Forest
Juneau Ranger District
8465 Old Dairy Road
Juneau, AK 99801

RE: **Kensington Gold Project - Comments on the DSEIS**

Dear Roger:

Coeur Alaska, Inc. (Coeur) is providing comments on the Draft Supplemental Environmental Impact Statement (DSEIS) for the Kensington Gold Project. The DSEIS provides a good description of the project and the potential impacts associated with construction and operations. During this process Coeur has been committed to enhancing the project to meet operational flexibility and minimizing the impacts by cooperating with the agencies and local community.

The alternatives put forth by the DSEIS provide a reasonable approach to evaluating other options for the project. Coeur believes that Alternative B provides a technically stable facility for the disposal of dewatered tails; along with a comprehensive monitoring plan, there is ample safe guards employed to ensure contingencies can be in-place which protects the environment. Coeur prefers Alternative B as described in the DSEIS. We have also continued to provide additional design details for the DTF option being proposed to the Alaska Department of Environmental Conservation, USFS, and CBJ, as part of the respective permitting processes. As part of this effort, we were involved in meeting with Mr. Harvey McLeod of Klohn-Crippen and Mr. Ron Rimelman of SAIC (the EIS contractor) and the CBJ Planning Commission in March, 1997. During those meetings Mr. McLeod fielded questions related to the DTF alternatives. In summary, Mr. McLeod made the following key points at the meeting: 35-1

- The DTF facility, as proposed, will work, barring any significant "mechanical changes" in the behavior of the local material properties it is constructed of.
- The proposal would provide for detecting potential areas of saturation and allow sufficient time to construct a berm, should such a condition be monitored.
- Operational monitoring would also provide the opportunity to monitor and actually "calibrate" the system, as built, to determine whether a berm is required at closure.

RESPONSES TO COMMENTS
Commentor No. 35: Coeur Alaska, Inc., Robert T. Richins

Response to Comment 35-1

The operator's general observations require some clarification on the long-term security of the facility in an unsaturated state. At present, information is not sufficient to state that even with monitoring and a good cover the facility would remain in an unsaturated state. This would depend on the actual performance of the structure and on the actual long-term care and maintenance program developed by the operator for closure of the facility.

- Stringent quality control would be required to meet the prescribed design criteria, as proposed by Coeur.

- Failure would require the combined effects of a large saturated zone together with a major earthquake event.

- The cover design, which is expected to evolved with operational monitoring and QA/QC measurements, would be sufficient to prevent saturation and erosion, and, thereby, provide for long-term maintenance of the facility in an unsaturated state. 35-1 (cont.)

- If large areas of saturation are monitored during the construction of Cell 1, it is likely the design would be changed so as to mitigate the situation. Likewise, construction would also be changed.

Alternative D, as Coeur understands it, may need some clarification. The DSEIS does not clearly state if the berm is necessary for all the cells. From Klohn-Crippen's report which supports the DSEIS, there is an indication that the berm isn't required if monitoring demonstrates otherwise. This would be consistent with our understanding from the meeting in Seattle and supported by supplementary reports to the DSEIS. 35-2

The following comments are supplied which provide specific comments on the DSEIS.

Page viii *All waste rock generated by the mine would either be used in DTF construction or backfilled.*

The proposed waste rock storage facility is sized to accept all the waste rock generated during the life of the project. Even though the DTF may require most of the waste rock, there will still be waste rock remaining in the facility at the end of mine life. During reclamation, slopes of the bench will be regraded and vegetated. 35-3

Page ix *... an engineered structural berm would be constructed around all cells of the DTF ...*

Coeur proposes that the structural berm be placed around the initial cell of the DTF and be evaluated through monitoring to determine the requirements of the berm in subsequent cells. 35-4

Page ix *... would coordinate with Federal and State agencies in implementing a broad monitoring program that addresses water resources,...*

Suggestion: .. would coordinate with Federal and State agencies in implementing monitoring programs that address water resources .. 35-5

Response to Comment 35-2

The selected alternative in the Forest Service Record of Decision includes a structural berm around three sides of all cells. If ongoing monitoring provides additional data on the likelihood of saturation and unit performance, the operator could request a modification to the Plan of Operations. This modification could include eliminating or modifying the berm for later cells. The Forest Service would evaluate such a request, based on the data available at the time.

Response to Comment 35-3

Some waste rock would be used in the construction of the process area foundations/benches. This would remain at closure and be regraded and revegetated. Section 2.3.3 of the Final SEIS has been modified to clarify this issue.

Response to Comment 35-4

Please see the response to Comment 35-2.

Response to Comment 35-5

The Summary of the Final SEIS has been modified accordingly.

Page xi *Visible emissions under Alternatives B through D would be similar to a cruise ship stack or Juneau's diesel-fired power generating station.*

The basis of this type of comparison should be verified for the reader. 35-6

Page xi *Geotechnical Considerations*

Use of the term "low to moderate risk of widespread saturation" is not technically supported of the implied level of risk substantiated. No risk assessment was made and this statement reflects on intuitive rather than scientific evaluation. 35-7

Page xiii *A large portion of the road would be visible.*

This statement should be premised that a large portion of the road would be visible from the air and not visible from Lynn Canal. 35-8

Page xiii *Aquatic Resources - Fresh Water*

It is considered move accurate to state that "habitat supporting an estimated ____ Dolly Varden would be impacted", rather than "with fish mortality of _____ Dolly Varden...". Removal of habitat does not necessarily imply mortality. 35-9

Page 2-2 *This chapter presents the four alternatives for the Kensington Gold Project: Alternative A - No Action, Alternative B - Proposed Action, ...*

Suggestion: This chapter presents the four following alternatives for the Kensington Gold Project. Alternative A - The No Action Alternative, is the selected alternative in the FEIS. Subsequent to issuance of the Record of Decision, this alternative was approved in the Final Plan of Operations dated July 7, 1992. All changes made to the 1992 proposal were made by Coeur to reduce or mitigate environmental impacts. Alternative B - The Proposed Action as detailed in the June 21, 1996 Plan of Operations... 35-10

Page 2-3 *Truck transport of diesel from beach to process area.*

Alternatives B and D should read "Truck transport of diesel from the intermediate tank to the process area. 35-11

Page 2-3 *DTF modified to include engineered structural berm around outer shell.*

Alternative D should read "DTF modified to include engineered structural berm around downslope sides, as shown in Figure 2-4". 35-12

Response to Comment 35-6

Section 4.1.2 of the Final SEIS has been modified to clarify the comparison.

Response to Comment 35-7

The use of the phrase "low to moderate risk of widespread saturation" is based on the Forest Service and Klohn-Crippen's current best judgment of possible events. At present, data are not sufficient to "sufficiently evaluate" risk. The Final SEIS analysis reflects the Forest Service and Klohn-Crippen's best attempt to assign a relative measure for the potential for saturation under each alternative. The Summary and Section 4.2 of the Final SEIS have been modified by replacing the term "risk" with "potential."

Response to Comment 35-8

The road would affect the vegetation, creating a different texture that would be visible from the large vessel routes in Lynn Canal. There is a high probability that the road would be visible because clearing would be 60 feet in width and perpendicular at points to Lynn Canal. In addition, the tailings dam proposed under Alternative A would screen the road; without this screening, it would become more visible. The entire road would be visible from the air.

Response to Comment 35-9

The Summary and Section 4.7.2 of the Final SEIS have been modified to reflect the "potential" for mortality of 125 to 170 fish. Also, please see the response to Comment 32-2.

Response to Comment 35-10

Thank you for you comment. The Forest Service Record of Decision identifies the selected alternative.

Response to Comment 35-11

Table 2-1 of the Final SEIS has been modified.

Response to Comment 35-12

Section 2.1 of the Final SEIS has been modified.

Page 2-5 *Waste rock would be stored temporarily in a 15 acre pile at the 800 foot adit. All waste rock generated during the life of the mine is expected to be used in DTF construction or backfilled.*

The design of the process area and portal bench will still contain waste rock generated from the mine, for the life of the project. During reclamation, slopes of the bench will be regraded and vegetated. 35-13

Page 2-5 *Ophir Creek would be diverted around the process area.*

Suggestion: Ophir Creek would be diverted away from the process area and around the sand and gravel borrow source. 35-14

Figures 2-2, 2-3, 2-4 Waste Rock: Temporary 15 acre pile at mine portal, all used in DTF construction and backfill.

The design of the process area and portal bench will still contain waste rock generated from the mine. During reclamation, slopes of the bench will be regraded and vegetated. 35-15

Figure 2-4, page 2-10

The schematic representation of the bermed DTF on this figure is misleading. It is inferred that the "horse shoe" shaped hatched areas on the figure represent the "berm". If this configuration were to be mandated, insufficient development rock would be available from mine development for berm construction. The consequence of this would be the need for additional borrow material. 35-16

Table 2-4, Summary of Potential Impacts

Spill potential - Alternative D. is unlikely to have less road traffic due to increase in borrow requirements and development rock haulage to DTF. Visual impacts - same as above. 35-17

Table 2-5, Summary of Potential impacts

Geotechnical Consideration - removal of the "risk" issue is suggested unless some technical definition and substantiation of these relative terms are developed. 35-18

Page 2-11 *.. waste rock be mined and moved to the surface using a conveyor system.*

Coeur's proposal is to transport waste rock to the surface by haul trucks. 35-19

Response to Comment 35-13

Section 2.2.2 of the Final SEIS has been modified. Please see the response to Comment 35-3.

Response to Comment 35-14

Section 2.2.2 of the Final SEIS has been modified.

Response to Comment 35-15

Please see the response to Comment 35-3.

Response to Comment 35-16

The "horse shoe" is the proposed configuration of the berm. One of the design considerations involved with developing this alternative was the amount of material available for the berm. Additional borrow material would not necessarily be required, because the berm could be constructed of compacted tailings, if necessary.

Response to Comment 35-17

The spill analysis discussed in Section 4.12.5 of the Draft SEIS does not indicate a significant change or reduction in the risk of diesel spills associated with Alternative D versus B, although Alternative D probably would use slightly less diesel. Similarly, the differences in visible impacts between Alternatives B and D would not be significant. Table 2-5 in the Final SEIS has been modified accordingly.

Response to Comment 35-18

Table 2-6 in the Final SEIS (Table 2-5 in the Draft SEIS) has been modified by replacing "risk" with "potential" in the section identified by the commentor. Because of the numerous uncertainties associated with the DTF design under Alternative B and the lack of proven similar examples, it is difficult to determine an exact probability of saturation and failure potential. Based on experience and professional judgment, the ranking approach used in the Final SEIS (low, moderate, and high) provides a reasonable method for comparing potential impacts under each alternative.

Response to Comment 35-19

Section 2.3.3 of the Final SEIS has been modified.

Page 2-11 *.. temporary stockpiling of the waste rock..*

Waste rock stockpiles, as shown on Drawings 1 and 3 in the Plan of Operations serve, in part, as a foundation for the mine portal and process benches. These benches will be regraded and vegetated at closure. 35-20

Page 2-13 *Figure 2-5*

In Alternative A the box following the Thickener should be labeled Pregnant Solution not Flotation Concentrate. 35-21

Page 2-14 *The operator also applied to ADNR to pump up to 49 gpm (0.1 cfs) from an upper Sherman Creek tributary.*

This sentence should be removed, there was only one application for 0.1 cfs withdrawal from Sherman Creek. 35-22

Page 2-17 *Section 2.3.4, Figure 2-7, Chemical Precipitation Treatment for Alternatives B through D*

The source listed for this figure is SRK (!996d). SRK did not generate this figure. NPDES Permit Application (1996). 35-23

Page 2-18 *The operator estimates that the Kensington Gold has an ore reserve..*

Suggestion: The operator estimates that Kensington Gold Project has an ore reserve.. 35-24

Page 2-19 *Section 2.3.7 Exploration (new section)*

A subsection should be added to 2.3 which addresses exploration. This subsection should state that under all proposals, that exploration would be the same as described and approved in the 1992 Plan of Operations. The Applicant would provide an annual update and schedule to describe planned exploration activities in detail. 35-25

Page 2-21 *Figure 2-8*

A Till material stockpile needs to replace the growth media stockpile in the initial construction and cell 1 configurations. 35-26

Response to Comment 35-20

Please see the response to Comment 35-3.

Response to Comment 35-21

Figure 2-5 of the Final SEIS has been modified.

Response to Comment 35-22

Section 2.3.5 of the Final SEIS has been modified.

Response to Comment 35-23

Figure 2-7 of the Final SEIS has been modified.

Response to Comment 35-24

Section 2.3.6 of the Final SEIS has been modified.

Response to Comment 35-25

The operator did not propose any changes to the exploration activities described in the 1992 FEIS. Therefore, this issue is beyond the scope of the SEIS analysis.

Response to Comment 35-26

Figure 2-8 of the Final SEIS has been modified.

Page 2-5 *Waste rock would be stored temporarily in a 15 acre pile at the 800 foot adit. All waste rock generated during the life of the mine is expected to be used in DTF construction or backfilled.*

The design of the process area and portal bench will still contain waste rock generated from the mine, for the life of the project. During reclamation, slopes of the bench will be regraded and vegetated. 35-13

Page 2-5 *Ophir Creek would be diverted around the process area.*

Suggestion: Ophir Creek would be diverted away from the process area and around the sand and gravel borrow source. 35-14

Figures 2-2, 2-3, 2-4 Waste Rock: Temporary 15 acre pile at mine portal, all used in DTF construction and backfill.

The design of the process area and portal bench will still contain waste rock generated from the mine. During reclamation, slopes of the bench will be regraded and vegetated. 35-15

Figure 2-4, page 2-10

The schematic representation of the bermed DTF on this figure is misleading. It is inferred that the "horse shoe" shaped hatched areas on the figure represent the "berm". If this configuration were to be mandated, insufficient development rock would be available from mine development for berm construction. The consequence of this would be the need for additional borrow material. 35-16

Table 2-4, Summary of Potential Impacts

Spill potential - Alternative D. is unlikely to have less road traffic due to increase in borrow requirements and development rock haulage to DTF. Visual impacts - same as above. 35-17

Table 2-5, Summary of Potential impacts

Geotechnical Consideration - removal of the "risk" issue is suggested unless some technical definition and substantiation of these relative terms are developed. 35-18

Page 2-11 *.. waste rock be mined and moved to the surface using a conveyor system.*

Coeur's proposal is to transport waste rock to the surface by haul trucks. 35-19

Response to Comment 35-13

Section 2.2.2 of the Final SEIS has been modified. Please see the response to Comment 35-3.

Response to Comment 35-14

Section 2.2.2 of the Final SEIS has been modified.

Response to Comment 35-15

Please see the response to Comment 35-3.

Response to Comment 35-16

The "horse shoe" is the proposed configuration of the berm. One of the design considerations involved with developing this alternative was the amount of material available for the berm. Additional borrow material would not necessarily be required, because the berm could be constructed of compacted tailings, if necessary.

Response to Comment 35-17

The spill analysis discussed in Section 4.12.5 of the Draft SEIS does not indicate a significant change or reduction in the risk of diesel spills associated with Alternative D versus B, although Alternative D probably would use slightly less diesel. Similarly, the differences in visible impacts between Alternatives B and D would not be significant. Table 2-5 in the Final SEIS has been modified accordingly.

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Table 2-6 in the Final SEIS (Table 2-5 in the Draft SEIS) has been modified by replacing "risk" with "potential" in the section identified by the commentor. Because of the numerous uncertainties associated with the DTF design under Alternative B and the lack of proven similar examples, it is difficult to determine an exact probability of saturation and failure potential. Based on experience and professional judgment, the ranking approach used in the Final SEIS (low, moderate, and high) provides a reasonable method for comparing potential impacts under each alternative.

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Response to Comment 35-26

Figure 2-8 of the Final SEIS has been modified.

Page 2-23 *Testing ... shows that paste material ... remain stable throughout the life of the mine.*

Suggestion: Testing ... shows that paste material ... and will remain stable.

35-27

Page 2-23 *Section 2.3.6 Backfill, last paragraph.*

The word 'slopes' should be 'stopes'.

35-28

Page 2-23 *At the portal, the pipeline would have a check valve to prevent backflush to the surface.*

A check valve at the portal would interfere with the proper draining of the line.

35-29

Page 2-25 *Under all alternatives, a shore-based platform raft with secondary containment systems would be used...as discussed on pages 2-25 and ...*

The proposal for the transfer of diesel fuel is different than what was detailed in the 1992 FEIS. Diesel fuel barges will be moored on buoys offshore of Comet Beach. Transfer of fuel will be accomplished through floating fuel lines deployed from the barge to the manifold located on the beach.

35-30

Page 2-29 *The diversion above the process area would be removed.*

The diversion above the process area will not be removed as shown in Sheets 12 and 13 of Appendix A.

35-31

Page 2-30 *... be required to develop an energy efficiency plan to minimize carbon dioxide emissions to the atmosphere.*

Coeur, as a minor source, does not foresee the requirement to submit an efficiency plan to minimize carbon dioxide emissions to the atmosphere.

35-32

Page 2-32 *Mitigate the effects of sidecast slash within 30 feet of road shoulders...*

Coeur considers that slash may be an important BMP that will reduce the effects of surface flow especially on road shoulders. No slash will be stockpiled in such a manner that it will create a visual impact.

35-33

Page 2-32 *Section 2.5.1 Mitigation, Visual Resources, second bullet.*

It is not clear what this text is describing about the design of the bench. This text needs clarification.

35-34

Response to Comment 35-27

Section 2.3.6 of the Final SEIS has been modified.

Response to Comment 35-28

Section 2.3.6 of the Final SEIS has been modified.

Response to Comment 35-29

Section 2.3.6 of the Final SEIS has been modified.

Response to Comment 35-30

The discussion of fuel transfer from barge to shore in Section 2.3.9 of the Final SEIS has been revised to be more consistent with the description presented in the 1992 FEIS.

Response to Comment 35-31

According to Section 2.3.13 of the Final SEIS, the storm water diversion ditch would be regraded and reclaimed upon final reclamation to ensure restoration of natural drainage within the watershed.

Response to Comment 35-32

There are no air quality standards for CO_2 emissions or authority to require mitigation. Therefore, the plan requirement has been deleted from Section 2.5.1 of the Final SEIS.

Response to Comment 35-33

The Forest Service concurs that the intent of the mitigation measure is to minimize the visual impact from the use or disposal of slash.

Response to Comment 35-34

If practical, the use of full bench cuts would eliminate the visual impact of cut and fill slopes. The use of full bench end hauling would eliminate the visual impact of overburden disposal. If the road crossed a natural slope greater than 55 degrees, the road prism should be excavated completely rather than constructing the prism of cut and fill material.

Page 2-32 *Section 2.5.1 Mitigation, Visual Resources, fourth bullet.*

The suggested reclamation species list includes scientific names, which is restrictive as to the species proposed to be used. A common name is more appropriate to use for a general description at present, providing flexibility in species choice in the future. The species list in the Reclamation Plan should be incorporated if appropriate. 35-35

Page 2-41 *... 15 acre temporary pile at mill.*

Waste rock stockpiles, as shown on Drawings 1 and 3 in the Plan of Operations serve, in part, as a foundation for the mine portal and process benches. These benches will be regraded and vegetated at closure. 35-36

Page 2-41 *Ophir Creek diverted, total habitat loss - 2,450 feet.*

Alternatives B through D should recognize that the habitat loss to Ophir Creek is temporary. 35-37

Page 2-43 *Air Quality - Alternative D*

This alternative will add increased levels of NO_x from the lower efficiency generator that will now be required at the DTF site. 35-38

Page 3-3 *Avalanches are not typical in these areas, but could occur as a result of deforestation or surface disturbance caused by construction.*

Coeur suggests the addition of language that describes the commitment to construct an avalanche shed above the 850 foot adit. 35-39

Page 3-6 *Sherman Creek Drainage Basin*

It should be stated that the USFS and ADFG are presently working on establishing an in-stream flow requirement for Sherman Creek. ADFG will request ADNR to appropriate water rights for fish habitation protection. 35-40

Page 3-7 *Runoff from the Ophir Creek sub-basin is fast and can account for as much as 90 percent of the peak flow to lower Sherman Creek (Kensington Venture, 1989).*

All references to Sherman Creek Hydrology should be to the 1994 Knight Piesold *Final Report on Hydrology.* 35-41

Response to Comment 35-35

Section 2.5.1 of the Final SEIS provides suggestions for varieties, along with the more general species names (e.g., Arctared Red Fescue-*Festuca rubra*). The varietal name is more restrictive rather than the species name. The suggestion of particular species is appropriate in that the seed mixture should consist of native species. The suggested varieties are actually commercially available and have demonstrated adaptability to Southeast Alaska growing conditions.

Response to Comment 35-36

Please see the response to Comment 35-3.

Response to Comment 35-37

Table 2-6 and Section 4.7.2 of the Final SEIS have been modified to reflect "temporary" loss of habitat.

Response to Comment 35-38

Based on further discussions with the operator, Alternative D would not require an additional generator at the DTF, and power requirements and emission rates would be comparable to Alternatives B and C. Therefore, the site would not be a "major source" under the Clean Air Act under any alternatives. Under Alternative D, the operator would be able to provide power to dewatering facilities at the DTF via underground lines from the generators at the process area. Section 2.3.8 of the Final SEIS has been modified to state that an underground powerline would be installed.

Response to Comment 35-39

Section 4.2.3 of the Final SEIS has been modified to include the construction of an avalanche shed above the adit.

Response to Comment 35-40

Section 4.7.2 of the Final SEIS has been modified to discuss instream flows.

Response to Comment 35-41

All references or statements from the Kensington Venture Mine Project, Alaska, Surface Water Hydrology Evaluation (Kensington Joint Venture, 1989) have been deleted from the Final SEIS.

Page 3-10 Stream Flow

Coeur has supplied monthly flow duration curves as a result of the ongoing Water Rights Application negotiations, which should be made part of the FSEIS. 35-42

Page 3-15 Table 3-8

For Station 105, the mean value for arsenic is outside of the range of detectable values, as is lead for Station 108. 35-43

Page 3-16 Since 1993, no analytes have been measured above their minimum detection limits.

This sentence should be removed from the document. 35-44

Page 3-25 Figure 3-10

Monitoring points 96-4 and 4a have been misplotted. 35-45

Page 3-36 Section 3.10.2 Vegetation, third paragraph.

The 'erucifer' needs to be defined. The term 'northern rockress' should read 'northern rockcress'. 35-46

Page 3-36, Section 3.10.2 Vegetation, 4th paragraph

The last sentence of this paragraph is difficult to understand. "Due to the habitat preferences and physical characteristics, respectively, of these species, it is unlikely that the individuals observed during the survey were not sensitive species." Clarification is needed as to whether this means that the recorded speeies are sensitive or not. 35-47

Page 3-39 Section 3.13 Cultural Resources

Additional information gained from the Section 106 consultations should be included in the SFEIS. 35-48

Page 4-5 Production Activity

The operational activities of the borrow pits and the screening plant have been omitted from the bullet list. 35-49

Response to Comment 35-42

The Final SEIS presents annual flow duration curves. The monthly flow duration eurves are included as an addendum to the *Technical Resource Document for Water Resources* (SAIC, 1997a). Section 3.5 of the Final SEIS refers the reader to the Technical Resource Document for these curves.

Response to Comment 35-43

The table was copied direetly from the NPDES permit application (Coeur, 1996c). Where sufficient data were available to perform statistical analyses, the minimum value represents the *lowest detected value* for each parameter. In these eases, there are also non-detected values. The mean values were determined using both detected and non-detected values. As a result, for the parameters identified in the comment, the calculated mean value is lower than the "minimum value." An explanatory footnote has been added to Table 3-8 of the Final SEIS.

Response to Comment 35-44

Section 3.6.1 of the Final SEIS has been modified.

Response to Comment 35-45

Well locations were plotted using coordinates presented in the *Dry Tailings Facility, Geotechnical Report, Kensington Gold Project* (SRK, 1996f). Based on this comment, well coordinates were checked, but no discrepancy was found.

Response to Comment 35-46

Section 3.10.2 of the Final SEIS has been modified.

Response to Comment 35-47

Section 3.10.2 of the Final SEIS has been modified.

Response to Comment 35-48

Please see the response to Comment 25-4. In addition, Section 3.13 of the Final SEIS has been modified to summarize results of the new cultural resource surveys.

Response to Comment 35-49

Section 4.1.1 of the Final SEIS has been modified to include "borrow pits, and screening plant" in the lists of production area emission sources. These activities were included in the emissions calculations.

Page 4-7 *Construction related pollutant emissions during the pre-production phase for Alternatives B through D would not exceed 9 tons of particulates per year (TRC, 1990).*

This statement is suspect and was taken directly from the FEIS. Since the surface disturbance has changed significantly and the DTF will be constructed incrementally over the life of the project, the estimation should be substantiated or removed. 35-50

Page 4-8 *Production Activity*

The operational activities of the borrow pits and the screening plant have been omitted from the bullet list. 35-51

Page 4-11 *4.1.5 Effects of Alternative D - Emissions and PSD Increments*

This section should reference the additional information presented by SAIC on air quality, specifically related to a slurry pipeline. Also this section does not recognize the change from minor to major source for the project with the addition of a generator located at the DTF. 35-52

Page 4-13 *Table 4-12. Predicted Emissions by Alternative (tons/year)*

Coeur notes that Alternative D does not reflect an increase in the amount of NO_x, SO_2, and CO, from the additional generator required at the DTF. 35-53

Page 4-24, Section 4.3.7, Summary, Table 4-16, Summary of Hydrologic Impacts by Alternative, and paragraph 1

See General Comments. 35-54

Page 4-27 *A sediment detention pond would be constructed to control storm runoff ... from the personnel camp, mill area, process area,... sand and gravel borrow area; ...*

The sand and gravel borrow areas will be equipped with sediment detention ponds. If the personnel camp is not constructed of 'contact development rock' it should be exempt from the treatment process of the sediment ponds. 35-55

Page 4-32, Table 4-17, NPDES Effluent Limitations Discharge Quality, Section 4.4.3, Effects of Alternative B (Proposed Action), Effluent Quality

There are a number of discrepancies between the values for various parameters in the table compared to the *NPDES Application and Technical Support Document (SRK,* 35-56

Response to Comment 35-50

The estimate of less than about 9 tons of particulates per year in the 1992 FEIS applied to all alternatives. This included Alternative F, Option 1 (similar to Alternative A in the Final SEIS) and Alternative E, which would have involved construction of a DTF. The total area of disturbance under all four alternatives in the Final SEIS is comparable. The total disturbance under Alternative A is actually greater than Alternatives B through D. Therefore, the predicted construction particulate emission rate (less than about 9 tons per year) has been retained in Section 4.1.2 of the Final SEIS.

Response to Comment 35-51

Section 4.1.2 of the Final SEIS has been modified.

Response to Comment 35-52

Please see the response to Comment 35-38.

Response to Comment 35-53

The additional generator would not be necessary. Please see the response to Comment 35-52.

Response to Comment 35-54

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

Response to Comment 35-55

Runoff from the sand and gravel areas would be managed separately from the treated mine drainage/process area runoff. Runoff from the personnel camp would be directed to the mine drainage/process area pond.

Response to Comment 35-56

Except for ammonia and nitrate, the reported values in Table 4-18 of the Final SEIS for untreated mine drainage are the 90th percentile concentrations for station 101. These values correspond exactly with Table 5-3 in the *Technical Resource Document for Water Resources* (SAIC, 1997a). The footnotes in Table 4-18 provide the basis for the projected ammonia and nitrate levels. The basis for the projected concentration for the discharge at outfall 002 is presented in the mass balance included in Section 5.3.3 and Table 5-11 of the *Technical Resource Document for Water Resources*, as well as in the draft NPDES permit fact sheet. Note that the projected concentrations are modified as described in these documents from those provided in the operator's NPDES permit application. In its NPDES permit application (Coeur, 1996c) and supplemental information (SRK, 1996d), the operator included dilution provided by upland runoff in projecting outfall 002 characteristics (identified as "diluted outfall 002" flow). To provide a conservative projection of DTF effluent characteristics, this dilution has not been included in the projected outfall 002 discharge composition described in Table 4-18 of the Final SEIS. However, the reference has been changed to "modified from Coeur, 1996c." In addition, the footnote on the TDS daily maximum limit has been corrected to "j." Moreover, the monthly average limit for TDS has been deleted to reflect the anticipated final NPDES permit.

June, 1996) and the *Supplemental Information Report, NPDES Application and Technical Support Document (SRK, September, 1996)* or the Table 5-3, "Summary of Surface Water Data - Sherman Creek Basin" in the *Technical Resource Document for Water Resources* (SAIC, February, 1997). The methods used to derive the values presented in the table need to be discussed in the text. 35-56 (cont.)

It is also not clear whether the "Project DTF Area Discharge Outfall 002" column is for diluted or undiluted DTF discharge. The derivation of the parameter values presented in the table need additional clarification, including all assumptions. In the text SRK is listed as the source for the model for DTF discharge water quality, yet the parameter values in the table do not correlate with either the undiluted or diluted DTF discharge values presented in the NPDES documents submitted by Coeur. The model used for deriving the effluent water quality values presented in the table and accompanying text need to be explained. 35-57

Page 4-35 ... *about 5 tons of lead nitrate would be required each year to support ore-processing operations.*

Should be: ... about 5 tons of lead nitrate would be required each year to support laboratory analysis. 35-58

Page 4-41 ... *however, a temporary storage pile would be maintained...*

Waste rock stockpiles, as shown on Drawings 1 and 3 in the Plan of Operations serve, in part, as a foundation for the mine portal and process benches. These benches will be regraded and vegetated at closure. 35-59

Page 4-42, Section 4.4.3, Effects of Alternative B (Proposed Action), Effluent Quality, DTF Effluent, paragraph 2

The discussion in the text references the *Prediction of Seepage Quality from the Dry Tailings Facility* (SRK, 1996c) for the DTF discharge water quality model, yet the parameter values in the "Project DTF Area Discharge Outfall 002" column in Table 4-17 of the SEIS do not correlate with either the undiluted or diluted DTF discharge values presented in the NPDES documents. The text needs to explain the assumptions used in the model for the DTF discharge water quality projection. 35-60

Page 4-47 *The potential impacts from spills of cyanide and chlorine would be eliminated because these materials would not be stored or used onsite.*

Coeur anticipates the use of chlorine based products in the domestic water treatment plant. 35-61

Response to Comment 35-57

Please see the response to Comment 35-56.

Response to Comment 35-58

Section 4.4.3 of the Final SEIS has been modified.

Response to Comment 35-59

Please see the response to Comment 35-3.

Response to Comment 35-60

The comment refers to the discussion on page 4-34 of the Draft SEIS. The references to SRK, 1996c and 1996d have been deleted from Section 4.4.3 of the Final SEIS. Please see the response to Comment 35-56 for additional discussion of the projected DTF discharge characteristics.

Response to Comment 35-61

Section 4.6.2 of the Final SEIS has been modified to indicate that the use of chlorine onsite would not be eliminated entirely.

Page 4-53 *... which would result in the loss of approximately 2,450 feet...*

Should be: ... which would result in the temporary loss of approximately 2,450 feet... 35-62

Also, this paragraph uses none of the detail which was presented in Konopacky's reports which describe the intermittent nature of Stratum 8 (South Ophir). To use the middle section of Sherman Creek is a gross misrepresentation of the potential impact to an intermittent stream when the data is available for review. 35-63

Page 4-63, Section 4.8.2 Vegetation, Effects Common to Alternative B through D, 1st paragraph

The 3rd and 4th sentences in this paragraph are duplicated from the 1st paragraph on p.4-62. 35-64

Page 4-64, Section 4.8.3 Wetlands, Summary, paragraph 2

Midway in paragraph 2 it is stated "These upland areas would support the development of Sitka spruce forest, a habitat type not currently represented at the site." In Section 3.10.3 of the SEIS it is stated "Forest wetlands are dominated by mountain hemlock and Sitka spruce..." which make up the overstory of these palustrine wetlands that are temporarily flooded through the year. In the FEIS, it is noted that minor amounts of Sitka spruce are mixed in with Western hemlock and mountain hemlock, and that Sitka spruce dominates along the edges of drainages, avalanche chutes, and the beach fringe. 35-65

Page 4-66 *These pits would be visible from Lynn Canal.*

Coeur suggests that these pits would be barely visible if not completely obscured. 35-66

Page 4-67 *...the Juneau access road ... adjacent to the DTF ... would make it impossible for the facility to meet VQO during operation...*

Coeur suggests that the road would be separated from the DTF with vegetation thereby providing limited exposure. 35-67

Page 4-85 *The risk of personnel fatality as a result of a transportation accident is estimated ... (about 1 in 15) for the project.*

Coeur would appreciate a cite for these types of estimations. 35-68

Page 4-92 *Table 4-34* 35-69

Response to Comment 35-62

Section 4.7.2 of the Final SEIS has been modified.

Response to Comment 35-63

Section 4.7.2 of the Final SEIS has been modified to indicate that flows in this reach are intermittent.

Response to Comment 35-64

Section 4.8.2 of the Final SEIS has been modified.

Response to Comment 35-65

Section 3.10.3 of the Final SEIS has been modified.

Response to Comment 35-66

Modeling conducted by the Forest Service has indicated that the back walls of the pits would be visible from Lynn Canal during operations.

Response to Comment 35-67

Although the DTF would be separated from the road by vegetation, it is unlikely that the DTF would be completely obscured from the Juneau access road.

Response to Comment 35-68

Section 4.12.3 of the Final SEIS has been revised to cite the technical report that documents the transportation accident risk calculations.

Response to Comment 35-69

Table 4-35 of the Final SEIS has been modified.

Aquatic Resources, Marine; Alternatives B through D should not identify an irretrievable loss of aquatic organisms in diverted portions of Ophir Creek as the diversion is temporary. 35-69 (cont.)

Page E-1 *Table E-1*

The monitoring of Station 106 has been discontinued. 35-70

Page F-3 *Figure F-2*

Monitoring points 96-4 and 4a have been misplotted. 35-71

General Comments:

- The discussion of Alternative B needs additional discussion concerning the assumption used for the stability analysis. For example, it is not clear I the discussion that the assumption used for the stability analysis were worst-case scenario assumptions. In addition, a contingency plan was included providing for construction of a toe berm, if deemed necessary based upon future stability analysis following construction. Additional information needs to be included in the discussion. 35-72

- The description for the NPDES outfalls need clarification and additional details. For example, it is unclear in the SEIS text whether the DTF effluent (Outfall 002) discharges via commingling and dilution with the surface water routes around the DTF, via the main stormwater diversion ditch, in the detention point prior to discharge, or whether the DTF effluent discharges prior to pond dilution. 35-73

- Figures 2-6, *Site Operational Water Balance,* references the source document as: "Modified from SRK, 1996d". The flow values for the 10-year, 24-hour storm events that are provided in this figure are not obtained from SRK documents. These flow values need to be checked and verified. The listed value of 4,409 gpm for the 10-year, 24-hour DTF infiltration estimate seems unreasonable. This value represents approximately one half of the total estimated precipitation (estimated at 9,909 gpm for 10-year, 24-hour). Similarly, it is not clear how the values used for precipitation, runoff and infiltration/evaluation at the mill site are denied. In this case, 2,115 gpm (58 percent of precipitation) and 1536 (42 percent of precipitation) is shown. It is unclear whether these values represent peak or average flows during the rainfall event. The methods used for calculating these numbers, including the assumptions should be identified for clarification. 35-74

Response to Comment 35-70

Monitoring at station 106 (Sweeny Creek) was discontinued after September 1994. Table F-1 of the Final SEIS (Table E-1 of the Draft SEIS) has been revised accordingly.

Response to Comment 35-71

Please see the response to Comment 35-45.

Response to Comment 35-72

The *Technical Resource Document for Geotechnical Considerations* (Klohn-Crippen, 1997) provides a detailed discussion of the factors considered in the stability analysis for each alternative. This document is included in the SEIS Planning Record. The Final SEIS notes that the potential for failure would be reduced because of extensive monitoring and the pre-designed contingency berm under Alternatives B and C.

Response to Comment 35-73

As discussed in the Final SEIS, outfall 001 discharges to upper Sherman Creek. Under Alternatives B and D, the DTF settling pond would discharge to Camp Creek. Camp Creek was previously identified as an unnamed creek in the Draft SEIS. Only the name has changed, not the discharge location. The non-contact diversion that flows north above the DTF also discharges to Camp Creek but separately from outfall 002 under Alternatives B and D. Section 2.3.5 of the Final SEIS clarifies this information.

Response to Comment 35-74

The flow values presented in Figure 2-6 of the Draft SEIS for the 10-year, 24-hour storm events were calculated using results of SEDCAD+ design runs provided in *Kensington Gold Project, Report on Sediment Ponds* (SRK, 1996g). Based on these data, calculations for the DTF water balance were as follows: 1) the 10-year, 24-hour rainfall equals 5 inches applied over 96.5 acres, equaling an average rainfall rate of 9,099 gpm, 2) the storm runoff to the DTF pond was 20.7 ac-ft (directly from the SEDCAD+ output results) averaged over 24 hours, which equals 4,690 gpm, 3) infiltration was calculated as the difference between precipitation (9,099 gpm) and runoff (4,690 gpm), totaling 4,409 gpm, and 4) discharge was calculated as the sum of storm runoff (4,690 gpm), the average DTF drainage (55 gpm), and the average tailings bleed (6 gpm), totaling 4,751 gpm. The calculations for the process area water balance were done similarly, using SEDCAD+ output results: 1) the 10-year, 24-hour rainfall is 5 inches of precipitation applied over 38.7 acres, equaling an average rainfall rate of 3,649 gpm, 2) the storm runoff from the process area is 9.34 ac-ft (directly from SEDCAD+ results), averaged over 24-hours, which equals 2,113 gpm, 3) infiltration was calculated as the difference between precipitation (3,649 gpm) and runoff (2,113 gpm), totaling 1,536 gpm, and 4) discharge was calculated as the sum of storm runoff (2,113 gpm) and the average treated mine water discharge (716 gpm), totaling 2,829 gpm. Figure 2-6 has been revised in the Final SEIS using updated SEDCAD+ modeling results (SRK, 1997b) for the process area pond, which assumes a 46-acre drainage area. The references for Figure 2-6 have also been updated.

Mr. Roger Birk
April 7, 1997
Page 13

Again, Coeur appreciates the Forest Service's efforts on the DSEIS. Coeur looks forward to completing the FSEIS. If you have any questions please contact either me or Eric Klepfer.

Sincerely,

for

Robert "Rick" T. Richins
Vice President,
Environmental Services and Governmental Affairs

ACWA

Alaska Clean Water Alliance
Conservation Fishing Subsistence Tourism Public Health
Box 1441, Haines AK 99827 Phone: (907) 766-2296 Fax: -2290 E-mail acwa@seaknet.alaska.edu
325 Fourth St., Juneau, AK 99801 Phone: (907)586-2751 Fax 907-463-5891

April 7, 1997

RECEIVED
APR 0
Juneau Ranger District

Roger Birk
EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, AK 99801

Re: Comments/Kensington Gold Project

The Alaska Clean Water Alliance is a nonprofit organization dedicated to the conservation of the watersheds of Alaska. Our mission is to ensure that all activities in Alaska's rivers, lakes, estuaries, wetlands, and marine waters protect public health and support the ecosystem. ACWA has reviewed the environmental impact statements for the Kensington Gold Mine Project and submits the following comments:

Socioeconomics
Mineral development usually causes significant environmental degradation, an economic cost as real as that associated with the depletion of any other resource. People's sacrifices in the pursuit of high quality living environments have demonstrated how valuable clean water, clean air, beautiful landscapes, wildlife, and recreation are. Environmental damage lessens human well being. As such, the Forest Service has been remiss in that the costs associated with environmental damage at the proposed Kensington mine has not been addressed in the Environmental Impact Statements.

36-1

When permanent or semi-permanent changes are made in a landscape, the economic value lost is not just that associated with current nonconsumptive use and value. Losses will continue. The reasons for this expectation are tied to conventional supply & demand analysis: the supply of undisturbed natural landscape is shrinking; the demand for such landscape as a source of environmental services (recreation, scenic beauty, water quality) is rising. Thus, the value of natural landscapes can be expected to rise relative to commodity values over time. The rise in the economic value of environmental resources relative to commodities is imperative in evaluating the Kensington project.

RESPONSES TO COMMENTS
Commentor No. 36: Alaska Clean Water Alliance, Irene Alexakos

Response to Comment 36-1

Consensus on an appropriate cost for valuing the loss of undisturbed landscape would be difficult to achieve, given the many different interests regarding the use of natural resources. Nonetheless, existing law permits mining on Federal land at the proposed mine location, subject to regulatory controls. Evaluation of the expected growth in the economic value of preserving the area is not within the scope of this SEIS.

Natural landscapes and ecosystems take centuries or millennia to develop. Landscapes and ecosystems modified by short-lived mining may take decades or centuries to recover. While the supply of wild lands cannot be enhanced and will probably shrink, demand will surely grow. When calculating the value of environmental losses associated with the Kensington Mine Project, the EIS has neglected to build into the analysis expected growth in economic value of preserving the area. 36-2

The most striking aspect of the socioeconomics section of the Kensington Mine Final EIS is the absence of discussion or consideration of whether proceeding with the mine is beneficial or desirable.

The socioeconomics section lists the number of jobs and the income the mine will generate, but discloses that most of these jobs will be filled by newcomers to the region and that much of the income will go outside the region (Final EIS p. 4-93). The population increase will drive up housing prices and property taxes in an already tight market (FEIS pp. 4-94-96). Apparently, mining has a high employment turn-over rate (FEIS p. 4-98), leading to problems from transient population and unemployment. For the City of Juneau, the annual costs of the increased services exceeds the additional city revenue, meaning that the mine produces a net loss for the city during each year of operation and a total net loss of nearly 7 million dollars (FEIS Table 4-29). Finally, the EIS discloses that the mine will operate for about a dozen years only (FEIS p. 4-103), eventually leaving thousands of new residents in Juneau without employment. 36-3

Given the many concerns associated with the project outlined above, the socioeconomics discussion is inadequate in its failure to grapple with whether the mine project should proceed at all. This failure also is reflected in the lack of discussion of whether to permit this mine in a LUD II area, which should be managed to preserve its wildland character. That a mine may be a permissible use is in itself no justification for permitting it. The EIS assumes that permissible equates to permitted, rather than disclosing and discussing the information and analysis needed to reach an informed decision. 36-4

The socioeconomics section also is deficient in its failure to discuss the worldwide gold market and the likelihood that the mine would shut down either periodically or permanently well before its predicted twelve years of operation, substantially reducing the mine's already questionable benefits. Mining has a long history of boom-and-bust operations with deleterious impacts on local communities. These potential impacts are not addressed at all in the EIS. Gold is not a strategic metal necessary for national security. Neither is it a commodity in short supply. 36-5

2

Response to Comment 36-2

The Tongass Land and Resource Management Plan (USFS, 1997b) addresses different land uses within the forest to accomplish the Forest Service mandate to manage National Forest System Lands for multiple use. The Kensington Gold Project is within an area approved for minerals development. While natural landscapes can take centuries to develop, the area around the Kensington Gold Project is a good indication that natural (and human aided) revegetation can occur relatively rapidly. This area once supported the town of Comet, as well as the Kensington, Horrible, and Ophir mines and the logging necessary to support these ventures. During this time, environmental controls did not govern waste disposal, mine water discharges, and land reclamation. Considering the recovery from previous mining impacts and the results of the analyses presented in this SEIS, the wild land character of the site is expected to fully recover. Also, please see the response to Comment 36-1.

Response to Comment 36-3

This comment appears to be based on the 1992 FEIS, which is not open for comment. Section 4.11 of the Final SEIS presents more recent socioeconomic information.

Response to Comment 36-4

The new Tongass Land and Resource Management Plan (USFS, 1997b) designates the area as Minerals, a change in status since publication of the Draft SEIS. This designation is assigned because the Kensington Gold Project has an approved Plan of Operations in place. The proposed mining operation is consistent with this land use designation.

Response to Comment 36-5

Section 4.11.2 of the Final SEIS has been modified to include the potential impacts associated with mine closure.

Although the FEIS uses the no-action alternative as a basis for baseline conditions, the FEIS fails to adequately consider the adoption of the no-action alternative as required by NEPA. The fact that an applicant has filed claims under the 1872 Mining Law does not preclude the Forest Service from adopting the no-action alternative. 36-6

The NEPA process is the primary means available to the public and decisionmakers to ascertain the costs of the proposed project. A proper accounting of the costs and benefits of the project has not been seriously undertaken. Since the government may review and challenge the validity of any mining claim at any time, it must address these issues in earnest at the outset. 36-7

Cumulative Effects

The discussion of cumulative effects is not presented in sufficient detail as to give the public a realistic picture of this and other projects planned for the Lynn Canal/Berners Bay area. The impacts of other projects such as the proposed road to Haines, Jualin Mine, Lace River Hydropower, and Goldbelt development in Echo Cove must be taken into account. The effects of increased air traffic, boat traffic, sewage runoff, waterfront development, and wetland loss need to be addressed. The herring spawning area, now centralized in the Berners Bay area is of particular concern. This stock has been far below the threshold spawning biomass necessary to conduct a commercial fishery since 1982. Given the scope of projects planned for this area, if herring are displaced, the result could be virtual elimination of the stock. These consequences must be addressed. In addition, the cumulative impacts of this and other planned development in the area to marine mammals. salmonids, mountain goats and other wildlife have not been adequately addressed. 36-8

Wetlands

It is our understanding that the proposed mine would disturb at least 250 acres of wetlands with a permanent loss of at least 51 acres due to the tailings pile. Permitting this loss runs contrary to the objective of the Clean Water Act: "*to maintain the chemical, physical and biological integrity of the Nation's waters.*" and to the President's policy of "no net loss". 36-9

Response to Comment 36-6

Section 2.2.1 of the Final SEIS explains the No Action alternative within the context of this analysis.

Response to Comment 36-7

NEPA does not require a dollar for dollar accounting of the costs and benefits of a Federal action. Sections 3.15 and 4.11 of the Final SEIS address the economic effects of the proposed mine within the context of the Juneau area economy. Potential impacts to resources are not evaluated on an economic basis for the reasons given in the response to Comment 36-1 but are presented as a means of measuring the "costs" of the action under consideration.

Response to Comment 36-8

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Response to Comment 36-9

Section 1.6.1 of the Final SEIS discusses the flexibility available to the Corps of Engineers in implementing the Section 404 permitting process.

Water Quality

The proposed levels of total dissolved solids will not meet drinking water standards nor the requirement that increases "*may not exceed one-third of the concentration of the water body*". Reclassification would ignore Sherman Creek's use for drinking water and would fail to satisfy the anti-degradation policy of the state's water quality standards. 36-10

Additionally, levels of arsenic, categorized as a "known human carcinogen" by the EPA, the U.S. Department of Health & Human Services, the National Toxicology Program, and the International Agency for Research on Cancer, would exceed the standards under the National Toxics Rule.

It seems that rather than accepting these issues as the serious problem they are, the government appears to be willing to grant waivers to the applicant. We object to this. 36-11

Water Withdrawals

The instream flow rates of Sherman Creek are projected from data for other watersheds rather than actual rates measured in Sherman Creek. The data appears to be inadequate to ensure protection of aquatic life in Sherman Creek. 36-12

Fuel Delivery

Given that weekly delivery of fuel is planned and that strong winds frequently blow from the north in the winter, it is illogical to state that "*virtually no risk of a spill is associated with a sinking barge.*" The possible should be expected. Indeed, it is irresponsible not to plan for otherwise. 36-13

Mandatory booming around fuel vessels and tertiary berming around fuel storage facilities should be required. Fuel should not be delivered or transferred in seas greater than three feet and during fishing openings in Lynn Canal. 36-14

Freshwater Aquatic Resources

Mine activity is likely to have a serious effect on the resident population of Dolly Varden and anadromous fish below the barrier falls in Sherman Creek. The DSEIS states that "*2,450 feet of habitat in Ophir Creek with fish mortality of 125 to 170 Dolly Varden*" would be eliminated. Again, we object to the government's willingness to disregard the environmental impacts of this project. 36-15

Response to Comment 36-10

Please see the response to Comment 4-5.

Response to Comment 36-11

The draft NPDES permit includes discharge limits consistent with the national toxics rule standard for arsenic. The Final SEIS and NPDES permit fact sheet both show that the discharges should comply with these limits, considering that the method detection limit is 3 µg/L. Please see the response to Comment 34-3.

Response to Comment 36-12

Please see the response to Comment 18-7. Instream flows are developed to protect aquatic life.

Response to Comment 36-13

The Summary of the Final SEIS has been revised to reflect a "very low" risk of spill from a barge sinking. As discussed on pages 4-108 and 4-109 of the 1992 FEIS, the frequency and severity of storms in Lynn Canal during winter months increase the potential for an accidental spill from a barge sinking, a barge grounding, or a container loss. The companies operating fuel barges on Lynn Canal have very good safety records, however. Page 4-47 of the 1992 FEIS provides data on oil pollution events in Lynn Canal from 1986 through 1990. No events were associated with fuel barge sinkings or damage during this period, and none have occurred since then, according to the U.S. Coast Guard. Based on this information, the risk of a spill associated with a sinking barge is low. To reduce this risk, fuel deliveries would be attempted only during periods of favorable conditions, when waves are less than 3 feet high. Also, please see the response to Comment 18-26.

Response to Comment 36-14

The barge companies operating fuel barges on Lynn Canal have very good safety records. Page 4-47 of the 1992 FEIS provided data on oil pollution events in Lynn Canal from 1986 through 1990. No events were associated with fuel barge sinkings or damage during this period, and none have occurred since then according to the U.S. Coast Guard.

During all barge to shore fuel transfers, a boat with attached containment booms would be located at Comet Beach to provide rapid response in case of a spill event. The Forest Service does not believe that tertiary berming is necessary around fuel storage facilities. In addition, neither EPA nor ADEC require tertiary berming. All fuel storage and transfer facilities would have secondary containment. Also, please see the response to Comment 18-26.

The C-Plan and the Plan of Operations require avoidance of fuel deliveries when seas are greater than 3 feet. The C-Plan requires the operator to avoid fuel deliveries during fishing openings, wherever possible. The operator also is required to work with the local fisherman on such scheduling. Such scheduling should be feasible given the 3-month onsite storage.

Fishing

The Point Sherman area is the habitual corridor to over 50% of the salmon returning to all rivers in upper Lynn Canal, therefore the biological integrity of this area is critical. The EIS fails to consider the adverse effects of a large spill on commercial, subsistence, charter, and personal sport fishing and fish processing. 36-16

Tailings

The EIS has concluded that there is essentially no risk of acid mine drainage from waste or mine rock. This conclusion is not supported by any technical information. 36-17

Conclusion

Intact ecosystems are increasingly scarce and unique. What we lose now, we cannot regain. It is in this context that Coeur's proposal must be considered. A multi-national corporation with a bottom line. There is nothing special or unique about an ounce of gold from the Kensington. It could come from any of a number of places. In a depressed year, the industry is likely to cope with falling prices by boosting productivity. But increased productivity, which all producers pursue, may serve only to maintain the downward pressure on price, and low prices render the Kensington economically marginal. 36-18

Contrast the two sets of economic values associated with the natuaral landscape of Lynn Canal. Gold is abundant, unnecessary, and in oversupply. By comparison, the Lynn Canal is in nearly pristine condition and rivals any National Park in terms of scenic qualities.

The government should no longer permit such waste of the public lands. We urge the U.S. Army Corps of Engineers, USEPA, and the Forest Service to select the no action alternative. 36-19

Sincerely,

Irene Alexakos

Irene Alexakos
Research Analyst

Response to Comment 36-15

Please see the responses to Comments 18-12 and 32-2. Mining activity is not expected to affect anadromous fish below the fish barrier in Sherman Creek. The loss of habitat for Dolly Varden in Ophir Creek would be temporary. The potential mortality of 125 to 170 Dolly Varden would not have a significant effect on the long-term survival of the resident population.

Response to Comment 36-16

Please see the response to Comment 18-14.

Response to Comment 36-17

The 1992 FEIS and the *Technical Resource Document for Water Resources* (SAIC, 1997a) summarize extensive acid testing and leachability analyses conducted on ore, waste rock, and flotation tailings samples. These data, along with the existing mine drainage monitoring results, support the conclusion that there is virtually no risk of acid generation.

Response to Comment 36-18

Lands managed by the Forest Service have been dedicated to multiple use, which includes mineral extraction. The recently revised Tongass Land Management Plan delineates the multiple use aspect of the Tongass National Forest and supports a long-term management approach that allows access to resources for mining or harvesting in some areas and restricts such uses in areas targeted for wilderness or old growth preservation. Also, please see the responses to Comments 36-1 and 36-2.

Response to Comment 36-19

The Forest Service Record of Decision presents the rationale for the selected alternative.

Goldbelt
9097 Glacier Hwy, Suite 200, Juneau, Alaska 99801 (907) 790-4990 Fax (907) 790-4999

RECEIVED
APR 0 1997
Juneau Ranger District

April 7, 1997

Roger Birk, EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, Alaska 99801

RE: Kensington Mine Project Draft Supplemental Environmental Impact Statement

Dear Mr. Birk:

Goldbelt, Incorporated is an Urban Corporation organized pursuant to the Alaska Native Claims Settlement Act for the benefit of the Tlingit and Haida people of the City and Borough of Juneau Goldbelt has been recognized as an Indian tribe, as defined in Section 4 of the Indian Self Determination and Education Assistance Act, P.L. 93-638, 25 U.S.C., 405b, and entitled to organize or operate any tribal services for the Alaska Native people of the City and Borough of Juneau.

Goldbelt supports the permitting and operation of the Coeur Alaska, Inc. Kensington Mine Project. Goldbelt has the following comments in regards to Local Consultation, Socio-economic issues and cumulative impacts mentioned in regards to the Kensington Draft Supplemental Environmental Impact Statement.

SOCIO-ECONOMIC IMPACTS

- LABOR

The first gold mines in Juneau provided the first tangible opportunity for Native people to be employed on an equal basis and to be trained in technical fields. From Goldbelt's perspective, the Kensington Mine is environmentally and socially acceptable because of the changes made by Coeur Alaska after conferring extensively with Goldbelt, other Southeast Alaska Native organizations, and other agencies, businesses and interest groups of Southeast Alaska. 37-1

The technical merits of the Kensington do more than make it acceptable in terms of environmental impact, it also brings our shareholders and local residents real employment and economic opportunity. This project will provide a vision and an incentive for young shareholders to become educated in and develop careers in science and engineering.

RESPONSES TO COMMENTS
Commentor No. 37: Goldbelt, Inc., David D. Goade

Response to Comment 37-1

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

- HOUSING

The City and Borough of Juneau in the February 1997 Draft Socioeconomic Impact Assessment had specified (in 1994) that Coeur Alaska will need to "encourage or cause to be built" 102 housing units in Juneau to satisfy the housing mitigation requirement in the large mine permit for the Kensington Mine Project. Coeur Alaska and Goldbelt, Inc. (Juneau's urban Native corporation) have entered into an agreement whereby Goldbelt will develop the required housing and Coeur will provide financial guarantees. The agreement will allow Coeur to focus its resources on the mine and allow Goldbelt to address Juneau's housing needs. The current (February 1997)mitigation wording in the Draft Socio-economic Impact Assessment states: "With housing availability at a low level, increased demand for housing due to the project is a significant impact. This demand would be substantially mitigated by the proposed worker camp at the mine site and the provision of 102 houses, planned by Coeur Alaska, Inc. under an agreement with Goldbelt, Inc., for which priority would be given the company's employees." 37-2

Goldbelt is currently negotiating to purchase non-ANCSA land in Juneau for this development project. Our intent is to provide multi-family housing for median and above median income families. This project will provide meaningful opportunities for local contractors and our shareholders for at least three to five years.

At present the timing of this project is dependent on the permitting schedule and process. Goldbelt will be committing significant resources before the permit is issued, and would encourage the permitting agencies to expedite the permitting process to allow for everyone involved to proceed with the confidence that the Kensington Mine will be a significant contributor to the Southeast Alaska economy.

LOCAL CONSULTATION

- ENVIRONMENTAL MITIGATION

Because it is our original homeland and environment, it is the nature of Goldbelt to consider the long term interests for this region. As people who have lived in Southeast Alaska for many generations, and foresee living in Southeast throughout the life of the Kensington Mine Project, and long after its closure - we are comfortable with both the social benefits it will bring to our people and with the planning for the environmental mitigation and reclamation of the area. 37-3

We believe Coeur's practice of consultation with all affected local parties and their commitment to training and employing the Native people and residents of Southeast Alaska has produced a model project that deserves to be permitted. The Kensington Project is both environmentally sound and socially acceptable to the shareholders, management and Board of Directors of Goldbelt, Inc.

Response to Comment 37-2

Thank you for your comment.

Response to Comment 37-3

Thank you for your comment.

CUMULATIVE IMPACTS

- ECHO COVE PLANNING

Goldbelt has been hard at work for 1 ½ years on developing a comprehensive development plan for its 1,378 acres of Alaska Native Claims Settlement Act land at Echo Cove. The process successfully produced a master plan document that clearly describes a vision for the limited development of our Echo Cove land. Basically the plan strikes a responsible and compatible balance between the following critical land use planning determinants:

- The ability to capture potential income producing opportunities that will bring significant economic value and employment to corporation shareholders.

- The successful compliance with City and Borough of Juneau (CBJ) regulations for development in a New Growth Area (e.g. Echo Cove).

- To conserve and preserve the aesthetic and recreational values of Echo Cove by limiting development and by utilizing sensible and appropriate environmental safeguards.
- To honor and preserve shareholder values and expectations for Echo Cove.

37-4

The other major outcome of the master planning process is that approximately 90% or 1,240 acres of Goldbelt private land at Echo Cove is *not* proposed for development. The remaining 10% that is proposed for development is concentrated at Cascade Point located just outside of Echo Cove. A sensible, site specific development plan for Cascade Point has been clearly identified. These facts unequivocally demonstrate our continued long-term commitment to responsible, thorough land use planning and also minimizes our impacts on the Echo Cove area.

It is important to note that the master plan is widely supported by shareholders who number close to 3,000. The plan has also been presented to the general public for review and comment at various stages of draft development. It should come as no surprise to anyone in Juneau that Goldbelt is seriously considering the limited and well-planned development of its private Native land at Echo Cove.

The following chronological list is a very brief summary of major master plan events to date:

- August 1, 1995: Formal initiation of master plan process and selection of consultant team.

- August 15, 1995: Met with CBJ staff to clarify master plan process, timing, and goals.

- August 24, 1995: First public meeting held to introduce the master plan process and to solicit public comments and to identify issues.

37-5

Response to Comment 37-4

Thank you for your comment.

Response to Comment 37-5

Thank you for your comment.

- September 26, 1995: Presented master plan project to CBJ Planning Commission to solicit their comments and identify issues.

- November 10, 1995: Presented master plan project to Goldbelt Board of Directors to solicit their comments and identify issues.

- November 14, 1995: Reviewed plan development status with CBJ staff.

- November 14, 1995: Second public meeting held to present the draft master plan and to solicit public comments.

- November 18, 1995: Presented draft master plan to Goldbelt Board of Directors for comments and concurrence.

- January 13, 1996: Master plan presented to and approved by Goldbelt Board of Directors.

- January 29, 1996: Scoping meeting with CBJ staff concerning formal submittal of the master plan for Planning Commission approval.

- April 3, 1996: Master plan submitted to the CBJ to initiate their review and approval process.

- April 1996 to March 1997: CBJ still working on completing its review and approval process which involved Comprehensive Plan and zoning ordinance amendments. 37-5 (cont.)

As can be seen from the above list, development of the master plan has been an involved, systematic, and focused process. General public concerns and local government participation and guidance has been included throughout the planning process.

The following two facts provides further evidence of Goldbelt's long-term commitment to responsible, effective land use management and planning:

- In 1988 Goldbelt traded 6 acres of its Echo Cove land to the CBJ so a public boat launch facility could be built at the head of the cove.

- In 1994 Goldbelt concluded a land trade process with the U.S. Forest Service that involved approximately 1,200 acres of its Echo Cove and adjacent Berners Bay land holdings. The net result of this action put significant, environmentally sensitive land back into public ownership. CBJ New Growth Area regulations require Goldbelt to prepare a master land use plan before any significant development may occur on our private Echo Cove land. By regulation, we are required to contemplate all future potential development scenarios whether or not we will ever actually propose them. This is why the master plan includes phased developments that range from reasonable foreseeable events such as dock construction for marine transportation services to long-term theoretical events such as residential growth and school construction.

The master plan has been misunderstood by a few members of the general public in that it has been said that we are proposing to build a "city" at Cascade Point. This is an unfortunate and misguided assumption that is solely based on our compliance with CBJ regulations that creates an artificial and theoretical view of future events. Our sensible, more pragmatic approach to potential future events is based on a realistic return on investment analysis. That is, in order to capture a future investment opportunity such as a marine transportation service and therefore actually be developed, it must first be able to provide an acceptable financial return on investment. This is our primary decision whether or not a particular development is constructed at Cascade Point. The mere presence of a future development possibility, such as a school, in the master plan document does not mean that it will occur. Our best guess at the realistic ***full*** development potential of Cascade Point would resemble a ***very small*** village or hamlet rather than the misnamed and misleading label of "city". 37-6

A final point concerning Goldbelt's land use planning for Echo Cove involves the often mentioned and generally ambiguous term "cumulative impacts". While this term has specific governmental definitions associated with it, the general public may have a more loosely applied notion of the term's meaning and especially its relevance to Goldbelt's land use planning at Echo Cove.

Goldbelt makes the defensible argument that it has thoroughly addressed the cumulative impact of its proposed development actions at Echo Cove. That is, Goldbelt has mitigated its potential development impact on Echo Cove and Berners Bay by its past actions (land trades) and present actions (development of a master plan).

By planning to develop only 10% of our private land at Echo Cove and by our self-imposed development limitation, Goldbelt has effectively mitigated potential adverse impacts on the greater Berners Bay area. We have probably accomplished more than can reasonably be expected of a private land owner in terms of responsible land use planning including impact identification, avoidance and mitigation. The only other obvious way to further mitigate our potential impacts would be to abandon any and all development plans for the area. While this may satisfy and please a few narrowly focused special interests, this topic is a separate, serious legal issue and is beyond the scope of this writing. It can be fairly stated that Goldbelt has thoroughly considered its role in the larger picture of possible Berners Bay developments and has successfully minimized all potential adverse impacts. To this end, Goldbelt has effectively and clearly met its responsibility to address its share of cumulative impacts. 37-7

In summary Goldbelt, Incorporated has ample reason to believe that all of the Kensington Project impacts are well defined, the project is environmentally and socially acceptable and that the project should be permitted as proposed.

Response to Comment 37-6

Thank you for your comment.

Response to Comment 37-7

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Sincerely,

GOLDBELT, INCORPORATED

David D. Goade

David D. Goade
Vice President, Lands

cc: Ben Cope USEPA
Victor Ross, COE
Sharmon Stambaugh, ADEC
Coeur Alaska, Inc.
Gretchen Keiser, CBJ

Southeast Alaska Conservation Council

SEACC 419 6th Street, Suite 328, Juneau, AK 99801
(907) 586-6942 phone (907) 463-3312 fax
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April 7, 1997

Roger Birk
Minerals Management Specialist
Juneau Ranger District
8465 Old Dairy Road
Juneau, AK 99801

Dear Roger:

The following comments are submitted on behalf of the Southeast Alaska Conservation Council (SEACC) on the Kensington Gold Project Draft Supplemental Environmental Impact Statement (SDEIS) for Coeur Alaska, Inc.'s proposed gold mine on lands adjacent to Lynn Canal and the Berners Bay Legislated LUD II area.

Founded in 1970, SEACC is a coalition of fifteen local citizen, volunteer conservation groups in twelve Southeast Alaska communities, from Ketchikan to Yakutat. SEACC's individual members include commercial fishermen, Native Alaskans, small timber operators and value-added wood manufacturers, tourism and recreation business owners, hunters and guides, and Alaskans from all walks of life. SEACC is dedicated to preserving the integrity of Southeast Alaska's unsurpassed natural environment while providing for balanced, sustainable use of our region's resources. Southeast Alaska contains magnificent old-growth forests, outstanding fish and wildlife habitat, important "customary and traditional" or subsistence use areas, excellent water and air quality, unsurpassed outdoor recreation opportunities, world class scenery, and provides a unique way of life for hardy, independent people who choose to call it home.

SEACC is also a member of the Kensington Coalition, an affiliation of seven conservation and Native organizations in Juneau and Haines. We fully support and *adopt by reference* the comments submitted by the Kensington Coalition on this SDEIS, including the March 31, 1997 report by Dr. David Chambers from the Center for Science in Public Participation enclosed with those comments.

THE SCOPE OF THE SUPPLEMENTAL DRAFT EIS AND THE INADEQUATE CUMULATIVE IMPACT ANALYSIS PREPARED PRECLUDE CAREFUL, PRUDENT, AND INFORMED DECISION MAKING.

When it passed the Tongass Reform Law in 1990, Congress identified 46,000 acres of the Berners Bay watershed as one of 12 areas on the Tongass "to be managed in perpetuity in accordance with Land Use Designation II (LUD II)." This area was chosen for special management because of its high value fisheries habitat and the fact it is a very popular recreational destination for local residents. Recreational activities include kayaking, fishing, camping and hunting. Protection for these special values have been recommended and supported by the Alaska Department of Fish and Game (ADF&G), Alaska

communities, and commercial fishermen.[1] By designating Berners Bay as a Legislated LUD II, Congress directed the Forest Service to manage this area primarily "in a roadless state to retain [its] wildland character." This special management designation requires that any permitted development, such as mining on patented claims, be limited in scope to be compatible with the area's wildland character.

Under NEPA's "action-forcing" procedures, the Forest Service is required to have available and carefully consider detailed information concerning significant environmental impacts. This not only assures that important effects of a proposed action will not be overlooked or underestimated by the decision-maker but guarantees that the relevant information will be made available to the public, state and local decision-makers. While NEPA doesn't mandate particular results, it does prohibit uninformed agency action.

A. The Forest Service Unreasonably Restricted the Scope of the SDEIS to Proposed Modifications of the Plan of Operations for the Kensington Gold Project.

When deciding what actions to include in an EIS, NEPA regulations require the Forest Service to consider several kinds of actions, including connected, similar and cumulative actions. 40 C.F.R. § 1508.25(a). NEPA regulations require agencies to consider cumulative actions, "which when viewed with other *proposed actions* have cumulatively significant impacts and should therefore be discussed in the same impact statement." See 40 C.F.R. § 1508.25(a)(2) (emphasis added).

Although the Kensington Gold Project is located just outside the Berners Bay Legislated LUD II area, it is merely the first of a multitude of projects that could impact this special area's fish, wildlife, and recreational values. In scoping comments submitted by some member groups of the Kensington Coalition, the Forest Service was requested to consider the cumulative effects of the proposed action, taken with other "reasonably foreseeable" proposed actions. See e.g., Letter from SEACC to Birk (Oct. 30, 1995). These proposed actions included the development and operation of the Jualin Mine Project, road access from Juneau to Haines, and development of Echo Cove by the Goldbelt Corporation. Since 1995, Lace River Hydro has begun an environmental assessment process for a 4.5-megawatt hydro project on the Lace River. This proposal could result in the issuance of a hydropower license from the Federal Energy Regulatory Commission and a Special Use Permit by the Forest Service. Finally, in a notice dated March 27, 1997, the Forest Service is seeking comments on a proposal by Temsco Helicopters to provide heli-hiking opportunities in the Lace River area in Upper Berners Bay. - 38-1

Because these "cumulative actions" will have effects on fish, wildlife, and the wilderness recreation uses in the Berners Bay Legislative LUD II area and Lynn Canal, the Forest Service should have assessed the individual and cumulative impacts of these projects in one comprehensive EIS. While the SDEIS notes the existence of some of these proposed actions, it merely provides the public and decision-makers with a cursory analysis of the cumulative impacts of these proposed actions on the resources and uses on the Berners Bay Legislated LUD II. **The Forest Service's decision to restrict the scope of this SDEIS to the Kensington Mine Project prevents it from educating itself and others about the larger context in**

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[1] In 1983, ADF&G recommended that this area be "reserve[d] permanently for protection of fish and wildlife." From 1987 to 1989, the communities of Juneau, Wrangell, Petersburg and Sitka supported protection of Berners Bay. In 1988, United Fishermen of Alaska included Berners Bay in a list of "priority fish habitat areas deserving protection."

2

RESPONSES TO COMMENTS
Commentor No. 38: Southeast Alaska Conservation Council, Buck Lindekugel

Response to Comment 38-1

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project. Please note that the land use classification for the Kensington Gold Project area has changed to Minerals Management (from Land Use Designation [LUD] II) in the recently revised Tongass Land and Resource Management Plan (USFS, 1997b). The Kensington Gold Project would be consistent with this land classification. Potential projects within the Berners Bay watershed have been included in the revised discussion.

which environmental decisions regarding the Berners Bay watershed are being made, thereby helping to improve the quality of the decisions made. This treatment not only violates NEPA but fails to provide the "careful and prudent" management required by Congress in designating this area for special management. 38-1 (cont.)

B. The Cumulative Impact Analysis Contained in the SDEIS is Cursory and Incomplete.

Setting aside our contention that the impacts from all reasonably foreseeable cumulative actions must be considered in the same EIS for a moment, NEPA also requires the Forest Service to evaluate "the incremental impact of the action when added to the other past, present, and reasonably foreseeable actions." 40 C.F.R. § 1508.7. Instead of addressing cumulative impacts in a <u>single</u> section specifically dedicated to important topic, the SDEIS utilizes a "piecemeal approach." This "piecemeal approach" fails to provide the Forest Service, other federal, state and local decision-makers, and the public with a reasonably complete discussion of the cumulative impacts from the Kensington Gold Project and the host of other projects proposed in the Lynn Canal/Berners Bay area. Several examples will demonstrate the inadequacy of the cumulative impact review contained in the SDEIS. 38-2

1. <u>Cumulative Effects from Construction and Operation of the Jualin Project</u>.

In assessing the cumulative effects of other reasonably foreseeable actions on Geotechnical Considerations, the SDEIS only notes (at 4-17) that "Construction [of the Jualin Project] would require an analysis of the feasibility of tailings management options. Options could include the use of the existing Kensington mill and tailings management facility for wastes from the Jualin Project." Postponing consideration of the cumulative impacts from using the Kensington mill and tailings management facility for mine wastes from both the Kensington and Jualin Projects violates NEPA. Uncertainty alone does not excuse a failure to address this issue fully because reasonable forecasting and speculation is implicit in NEPA. Thus, the SDEIS must not only consider and evaluate the risk of a tailings dam failure from the Kensington Project but the risk associated with using the Kensington facility for the Jualin tailings as well. Given that Couer Alaska has consolidated ownership of the Jualin and Kensington mining projects, this cumulative risk analysis must occur now to assure that important effects are not overlooked or underestimated. 38-3

2. <u>Cumulative Effects on Wetlands from the Kensington Project and Other Reasonably Foreseeable Projects</u>.

This discussion in the SDEIS acknowledges that wetlands within the region could be adversely impacted because of the Lace River Hydro project, Goldbelt's proposed Echo Cove development, the Juneau Access Project, and the Jualin Project. The SDEIS, however, fails to reasonably quantify the level of these impacts or their effect on recreation, fish and wildlife in the Berners Bay area. The Forest Service can not simply shift responsibility for analyzing these impacts to the Corp of Engineers' Section 404 permitting process. It is the Forest Service's responsibility to consider the effect on the region's wetlands from all reasonably foreseeable cumulative actions in this SDEIS. Its failure to do so violates NEPA. 38-4

3

Response to Comment 38-2

Please see the response to Comment 38-1 regarding cumulative impacts.

Response to Comment 38-3

The potential impact resulting from a combination of Kensington and Jualin tailings has been included in the cumulative impacts discussion only to the extent that if Jualin ore were processed using the Kensington facilities. The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Response to Comment 38-4

The extent of cumulative impacts to wetlands would be expected to be minimal considering the vast amount of wetlands and the rather limited size of the individual projects. Thus, the effect of impacts to wetlands on recreation, fish, and wildlife probably would be minimal over the cumulative impacts area. The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

3. Cumulative Effects on Visual Resources from the Kensington Project and Other Reasonably Foreseeable Projects.

The analysis of cumulative impacts to visual resources in the SDEIS (at p. 4-67) unlawfully postpones evaluations of impacts from "existing or reasonably foreseeable projects" until "specific proposal for the other projects is developed and submitted to the Forest Service." This conclusion is completely inconsistent with NEPA regulations. Those regulations require the Forest Service to consider the cumulative impacts "regardless of what agency (Federal or non-Federal) or person undertakes such other actions." 40 C.F.R. § 1508.7. 38-5

NEPA further requires the visual cumulative impact analysis to consider impacts beyond the discrete project area. Given that this project is adjacent to the Berners Bay Legislated LUD II area, and that impacts to visual resources from the development of other reasonably foreseeable projects (the Jualin and Juneau Access Projects) will occur beyond the Kensington Project Area, the SDEIS improperly constricts its analysis to "visual impacts observable from the Kensington Gold Project viewing area." It must again be emphasized that, given the special management direction imposed by Congress for the Berners Bay Legislated LUD II area, impacts to visual resources from reasonably foreseeable projects must include impacts in Berners Bay, as well as adjacent lands. We further note that visual impacts from Goldbelt's proposed development at Echo Cove, or construction of the Lace River Hydro Project, on Berners Bay are not even discussed. This must be done in this SDEIS. 38-6

Lastly, the SDEIS presumes that emissions from the Kensington Project's diesel generators will be the only impact on visual resources from the Kensington Project. However, given the proposed Lace River Hydro Project, it is foreseeable that an overhead transmission cable might be built across the Point St. Mary Peninsula to supply hydroelectricity to the Kensington Project. The visual impact from such a foreseeable project modification must be considered in this SDEIS. 38-7

4. Cumulative Effects From Various Transportation Projects.

In evaluating the cumulative effects from other reasonably foreseeable projects on transportation development in the Berners Bay area (SDEIS at 4-88,89), the Forest Service once again drops the ball. As noted above, NEPA does not permit the agency to ignore these impacts until later NEPA analysis is prepared or because some non-Federal agency is undertaking these actions. See 40 C.F.R. §§ 1501.2, 1508.7. In fact, Forest Service approval of this operating plan, the first major development project in the Berners Bay area, will constitute the condition precedent allowing or significantly encouraging further development by private interests or the State. 38-8

5. The SDEIS Fails to Assess Cumulative Impacts to Recreational Uses in the Berners Bay Area.

Amazingly, the SDEIS fails to consider or evaluate cumulative impacts to recreational use in Berners Bay from this project or other reasonably foreseeable projects. Chapter 3 of the SDEIS only mentions that "The discussion on recreation has not been revised." Moreover, Chapter 4 of the SDEIS does not even discuss the environmental consequences of the proposal on recreation resources. However, the Forest Service does acknowledged that other reasonably foreseeable projects than those identified in the 1992 FEIS are reasonable foreseeable. These new projects include Goldbelt's proposed development in Echo Cove, the Lace River Hydro Project, the proposed Juneau Access Road, and the Jualin Project. See SDEIS at 4-1. No mention is made of the Temsco heli-hiking proposal or the cumulative impact of this proposal to recreation or air traffic in the Berners Bay Legislated LUD II area. 38-9

Response to Comment 38-5

Please see the response to Comment 38-1 regarding cumulative impacts.

Response to Comment 38-6

Please see the response to Comment 38-1 regarding cumulative impacts and the response to Comment 26-8.

Response to Comment 38-7

Please see the response to Comment 38-1 regarding cumulative impacts.

Response to Comment 38-8

Please see the response to Comment 38-1 regarding cumulative impacts.

Response to Comment 38-9

Please see the response to Comment 38-1 regarding cumulative impacts.

Since the population of the City and Borough of Juneau (CBJ) has continued to increase since the issuance of the 1992 FEIS, it is logical to assume that recreational use of Berners Bay has also increased. The CBJ Community Development Department estimated a population of 30,209 in November, 1996 (SDEIS, p.3-40). In 1990, the U.S. Bureau of Census reported a preliminary estimate of the population of the City and Borough of Juneau at 26,696. In fact, the population of CBJ has increased at an average annual rate of 4% per year since 1970 (FEIS, p.3-75).

According to the 1992 FEIS, water-based recreation is popular in the Juneau area. One estimate is that one out of every 15 people in the Juneau area has a boat (Bethers, 1991)(FEIS, p.3-66). Using this estimate, 3,500 more people in the Juneau area means 233 more boaters potentially using the Berners Bay area. Future population increases in the Juneau area will only mean more pressure on favorite recreation places such as Berners Bay. These impacts need to be consider now in a comprehensive fashion. 38-10

THE SDEIS FAILS TO ADEQUATELY ASSESS IMPACTS FROM REASONABLY FORESEEABLE PROJECTS IN THE BERNERS BAY AREA ON RIVERS ELIGIBLE FOR INCLUSION IN THE NATIONAL WILD AND SCENIC RIVER SYSTEM.

In the 1991 draft supplemental EIS for the Tongass Plan Revision, the Forest Service recognized the remarkable values in this productive watershed by declaring the Antler, Berners, Gilkey, and Lace Rivers as "eligible" for designation under the Wild and Scenic Rivers Act. See SDEIS for TLMP Revision, Appendix E (1991). The Forest Service determined that the appropriate classification for each of these rivers was "Wild." At this time, the Forest Service has not yet made a final determination regarding which Tongass rivers will be recommended to Congress for inclusion in the National Wild and Scenic River System.

Section (d) of the Wild and Scenic Rivers Act requires all federal agencies to consider potential national wild, scenic, and recreational river areas in all planning for the use and development of water and related land resources. The Forest Service can not prejudice the four (4) Berners Bay rivers suitability by making a decision outside the TLMP Revision process which may bias a decision to designate these "eligible" rivers as "suitable." Although none of the eligible rivers are directly affected by the 1996 Revised Plan of Operations for the Kensington Project, NEPA regulations require agencies to consider reasonably foreseeable cumulative actions, "which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement." See 40 C.F.R. § 1508.25(a)(2). Because this proposed decision will constitute the condition precedent for allowing or significantly encouraging further development by private interests or the State of Alaska in this valuable area, the SDEIS should have considered these cumulative effects on the eligibility of these Berners Bay rivers. This SDEIS violates NEPA and the Wild and Scenic Rivers Act by failing to prepare a comprehensive impact analysis evaluating the impact of these projects on the eligibility of these rivers. 38-11

THE FOREST SERVICE FAILED TO DISCHARGE ITS AFFIRMATIVE RESPONSIBILITY TO LOCATE, IDENTIFY AND EVALUATE IMPACTS TO HISTORIC PROPERTIES WHICH MAY BE IMPACTED BY ACTIVITIES APPROVED IN THIS DECISION.

The discussion and analysis of potential impacts of the proposed project to historical and archaeological resources in the project area is inadequate. In both describing and evaluating effects to cultural resources in the SDEIS, the Forest Service relies completely upon the 1992 FEIS. The FEIS (at p. 3-70) identifies one site (49-JUN-013) which might be impacted by an earlier project alternative. In describing the potential impacts, the FEIS (at p. 4-82, emphasis added) concedes that "the presence and nature of 38-12

5

Response to Comment 38-10

Please see the response to Comment 38-1 regarding cumulative impacts.

Response to Comment 38-11

Please see the response to Comment 38-1 regarding cumulative impacts.

Response to Comment 38-12

Cultural resource surveys conducted since publication of the Draft SEIS investigated the sites previously identified as potential cultural sites. The surveys did not identify evidence of prehistoric occupation or any historic resources. Section 3.13 of the Final SEIS has been modified to reflect these results.

prehistoric or nonmining historic resources have not been fully determined." The 1992 FEIS goes on to claim that "Additional testing of resources prior to construction would determine the presence or absence of archaeological sites." Five years later, however, this SDEIS notes that "Additional literature search, consultation with Native American Tribes, ground truthing, and testing would be required to confirm the presence or absence of cultural resources at some locations within the project area." See SDEIS at 4-65. No explanation is offered regarding why the necessary surveys and other actions have not been completed. For this reason, this decision violates Section 106 and 110 of the National Historic Preservation Act (NHPA), NHPA implementing regulations under 36 C.F.R. § 800, and NEPA. 38-12 (cont.)

Section 106, 16 U.S.C. § 470(f), requires the Forest Service to take into account the effect of their undertakings on historic properties, and provide the Advisory Council on Historic Preservation (Council) a reasonable opportunity to comment on the agency's undertakings. Under Section 110, 16 U.S.C. § 470h-2, the Forest Service is required to conduct adequate surveys to locate "any" and "all" sites of historic values. See Romero-Barcelo v. Brown, 643 F.2d 835, rev'd on other grounds sub nom. Weinberger v. Romero-Barcelo, 456 U.S. 305. 38-13

To meet these requirements, the above processes should run concurrently with the NEPA review process. See 36 C.F.R. § 800.9(a). The purpose behind this regulation is to "provide the public with the fullest and most complete information available on effects on historic and cultural resources and alternatives to reduce those effects." Id. This purpose was not fulfilled in this SDEIS. Postponing the required surveys until after completion of EIS process further denies the public their opportunity to comment on the effects from this proposal on identified historical and cultural sites and to consider alternatives which would reduce those effects. 38-14

Best Regards,

Buck Lindekugel
Conservation Director

cc: Kensington Coalition

Response to Comment 38-13

Please see the response to Comment 38-12.

Response to Comment 38-14

Please see the response to Comment 38-12.

INSIDE PASSAGE MARINE, INC.
P. O. BOX 32098
JUNEAU, AK. 99803
907-586-3423 PHONE
907-586-3495 FAX

TO: ROGER BIRK / EIS TEAM LEADER
SUBJECT: KENSINGTON MINE PERMIT
DATE: APRIL 7, 1997

ATTACHED PLEASE FIND A COPY OF A LETTER THAT WAS SENT TO THE CITY & BOROUGH OF JUNEAU PLANNING COMMISSION DURING THEIR DSEIS REVIEW PROCESS. I HAVE CARBON COPIED THIS LETTER TO VICTOR ROSS, ARMY CORP OF ENGINEERS / REFERENCE #2 - 900592 WETLANDS PERMIT AND BEN COPE, US EPA REGION 10 / NPDES PERMIT.

THANK YOU FOR YOUR ATTENTION TO THIS MATTER.

SINCERELY,

Linda Hay

LINDA HAY
P. O. BOX 20966
JUNEAU, AK. 99802
907-789-1523

INSIDE PASSAGE MARINE, INC.
P. O. BOX 32098
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April 6, 1997

Planning Commission Members
% Gretchen Keiser - Mine Permit Coordinator
Department of Community Development
City & Borough of Juneau
155 South Seward Street
Juneau, AK. 99801

Dear Planning Commission Members:

I submit this letter as written back up to previously submitted verbal testimony given on April 3rd in support of Coeur Alaska's Kensington Mine Project. I feel strongly that Coeur has made every effort to respond and comply with the concerns of community groups, environmental organizations, the fishing industry, the tourist industry and those of us who take pleasure in the ability to go out and enjoy the surrounding natural beauty of Southeast Alaska. 39-1

Requirements to meet all federal, state and local permits are being addressed - and with few exceptions, the Kensington Project is within specifications. There are some issues still to be resolved and in particular, I would urge the Planning Commission to not hold the Kensington Project to unmeasurable water quality standards which even the City and Borough of Juneau cannot meet in their own drinking water supplies. 39-2

When Coeur Alaska became the sole owner of the Kensington Mine, they sought to prove to the communities of Juneau and Haines that extracting mineral resources which are used in an endless variety of everyday products, can be done with minimal impact to the environment. 39-3

As an observer of the Kensington Hearings and the previous A J Mine Hearings, it is fairly apparent that a similar pattern is developing - one which involves constant second guessing and revisiting issues which have already been addressed. References to studies that are outdated serve no purpose other than causing confusion to the general public. Supplemental information that is being requested as part of the DSEIS is beyond the intent of the document. It is my understanding that the DSEIS is designed to be a supplement to the original FEIS and that the DSEIS should be dealing with changes that have occurred to the mine plan subsequent to the issuance of the FEIS. Instead it appears that staff is requesting reevaluation of portions that have not changed in the original mine plan. 39-4

Another point which I feel a need to address is the suggestion by staff on regulations regarding barge deliveries of fuel to the site. My question is this - does the City and Borough of Juneau have jurisdiction on the navigable waters of the U. S. and the regulation of marine traffic? Isn't this a function of the U. S. Coast Guard? Since Coeur has been working closely with the fishing industry and tug and barge companies are familiar with working under these conditions, it would seem radio communications between the tug and fishermen will enable them to coordinate this traffic according to Coast Guard regulations. 39-5

RESPONSES TO COMMENTS
Commentor No. 39: Inside Passage Marine, Inc., Linda Hay

Response to Comment 39-1

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

Response to Comment 39-2

Thank you for your comment.

Response to Comment 39-3

Thank you for your comment.

Response to Comment 39-4

Thank you for your comment.

Response to Comment 39-5

Thank you for your comment.

I would strongly urge the Planning Commission to hold to its original schedule and move forward with the permitting process for the Kensington Mine. Continue to work with the various government entities and Coeur Alaska - all have spent countless hours and enormous amounts of money to insure that this project meets regulation. A detailed monitoring system is being crafted which will be implemented during the construction phase, life of the mine and reclamation at the end of the project. 39-6

I would also request that "cumulative effects" not be allowed to delay this permit process. Holding Coeur Alaska and the Kensington Project responsible for any and all projects "potentially" planned for Berners Bay and the surrounding area is mind boggling to me! Do we hold every homeowner who builds in an area for the first time responsible for all others who follow and the impacts to the environment? Do we hold every kyaker responsible who discovers an untouched area - tells others who then travel there and ultimately create an impact on the environment? The first "footprint", as it has been described, should not be responsible for what happens for perpetuity. Coeur Alaska should be commended for their wholehearted attempt to make their "footprint" as small as possible. Considering what has been happening to the timber industry in Southeast Alaska, the Kensington Mine Project should be encouraged because of the economic benefits it will bring and the job opportunities it will provide. 39-7

Thank you for your attention to this matter.

Respectfully,

Linda Hay

Linda Hay
Inside Passage Marine, Inc.

cc: Roger Birk, EIS Team Leader / Juneau Ranger District
Ben Cope, US EPA, Region 10 RE: NPDES Permit
Victor Ross, Army Corps of Engineers RE: Reference #2-900592 Wetlands Permit

Response to Comment 39-6

Thank you for your comment.

Response to Comment 39-7

Thank you for your comment.

RECEIVED
APR 0
Juneau Ranger District

April 7, 1997

Roger Birk
EIS Team Leader
Juneau Ranger District
8465 Old Diary Road
Juneau, AK 99801

Dear Roger Birk:

The Juneau Audubon Society (JAS) with over 300 members throughout Southeast Alaska represents a diverse section of the community. Juneau Audubon members are interested in the continual health of habitats that support a wide variety of wildlife. As proponents for the protection of habitat and wetlands JAS would like our comments to be considered on the Draft Supplemental Environmental Impact Statement (SEIS) for the Kensington Mine Project.

The JAS does not feel that this project has merit in adding to the human condition when compared to the expenditures of non-renewable resources and degradation to environmental health. As members of the "global" community, we feel that it is necessary to consider our role in improving the global environment and in taking the responsibility of minimizing our impacts. The SEIS gives us some understanding of the costs in environmental "equity" that must be paid. The JAS feels that the effects of the proposed mine are not trivial, and if considered cumulatively, make a measurable impact on to our global environment.

General Comments

The wetlands inventory for the site demonstrated that the majority of the lands are classified as wetlands. The JAS is concerned about the proposed loss of wetlands habitat (up to 270 acres). These wetlands provide habitat for resident wildlife population and migrating bird species. The JAS encourages the Forest Service to require modifications to the project that would minimize the fill and destruction of wetlands. While the Corp of Engineers is the responsible federal agency that permits wetland filling, the Forest Service should take an active role in encouraging the improvement of the environment in exchange for altering existing functional habitat. At a minimum the operator should perform off-site mitigation. For example, the operator should be required to restore or preserve other threaten wetlands in the communities of Juneau and Haines. 40-1

Cumulative Impacts

The DEIS fails to address the cumulative effects on the environment from this project and associated developments such as the Lace River Hydroelectric project and Goldbelt's Berners bay proposed townsite. The JAS believes that the Forest Service must assess the cumulative impacts in the DSEIS before a final version is issued. The Forest Service is responsible for mitigating environmental impacts of projects on National Forest lands. The JAS urges the Forest Service to explore the maximum and minimum expected impacts from all proposed activity in association with the Kensington Mine project. 40-2

Specific Comments

Sedimentation Ponds

RESPONSES TO COMMENTS
Commentor No. 40: Juneau Audubon Society, Chris Kent

Response to Comment 40-1

Section 1.6 of the Final SEIS discusses the responsibilities of the relevant agencies and describes the flexibility available to the Corps of Engineers in implementing the Section 404 permitting process. Also, please see the response to Comment 18-13.

Response to Comment 40-2

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

The document states that sedimentation ponds would be left open as mitigation for wetland loss. Since these ponds will be subject to runoff and sedimentation from the dry tailings disposal site, JAS is concerned that that "bioamplification" of metals may negatively affect wildlife utilizing these ponds. Wetland vegetation species are well known for their ability to absorb metals from sediments and have been utilized in contaminated areas as a natural method to clean soils. Consumption of this vegetation by aquatic invertebrates, bottom feeding ducks and insect eating wildlife (Water Ouzels - dippers) could cause the build up of metal concentrations in resident and migrating wildlife. The Forest Service should require that metal concentrations in sediment in these pond areas be protective of aquatic life. 40-3

Dry Tailings Pile

The plans for dry tailings call for three "cells" to be developed over the lifespan of the mine. The JAS recommends that upon completion of a "cell, " the operator should immediately start rehabilitation efforts. The establishment of vegetation would intercept rain fall and aid in the prevention of erosion. The Forest Service should study the rehabilitation success of these areas while the operator is still on site. Such a study could prevent costly remobilization if additional rehabilitation is needed. The JAS also believes that an active program of rehabilitation for the barrow pit areas subsequent to closeout be required. 40-4

Wildlife

The DEIS mentions stream habitat loss and possible impacts to fish. It fails to mention that stream, wetlands and forested habitat support wildlife other than commercial species. Stream habitats are critical to a number of bird species as well as fish. The JAS believes that the document in its analysis of habitat loss, should consider impacts to migrating and residents wildlife that are considered "non-game." 40-5

Tailings Slurry

In the DEIS, the accidental spill rate for the tailings slurry pipeline was assumed to be the same as it is for petroleum. This assumption fails to consider the difference in material characteristics between petroleum and a rock slurry. Rock slurries carry finely ground minerals that have sharp interfaces and therefore are more erosive in nature than petroleum. The abrasion by rock slurry material to pipeline walls may cause a catastrophic release of the pipeline contents. The DEIS should assume that a tailings slurry pipeline will wear-out a higher rate than a petroleum pipeline. The construction of the slurry pipeline should plan for regular replacement of the pipeline to prevent possible releases. In sum, the environmental consequences should consider a slurry pipeline with a higher than average spill rate because of the erosive nature of the materials carried within the pipeline. 40-6

Mitigation and Monitoring

The use of bridges rather than culverts on streams that support anadromous fish should be employed. Bridges offer the least disturbance to stream channels and habitat. Bridges have also been known to provide habitat for birds that normally use stream and near stream habitats. Bridges offer greater mitigation than culverts because they can be used for nesting areas and cover for birds. 40-7

The use of grass seed to stabilize soils around roads can draw wildlife to these areas. This can result in deer and bird strikes by passing vehicles. The JAS recommends that interlocking geo-textile 40-8

Response to Comment 40-3

Bioamplification of metals can occur in wetland vegetation. However, the projected discharge quality associated with the DTF is consistent with background concentrations of metals in the Terrace Area and Sherman Creek drainage basins. Therefore, the Forest Service does not anticipate metals accumulation in vegetation above background levels. The discharge from the DTF would be monitored during active operations. If unexpectedly high metals levels were observed, treatment probably would likely be required similar to the mine drainage system. At closure, all DTF slopes would be capped to limit infiltration and revegetated. Therefore, the inflows into the pond after closure are not expected to produce elevated metals loadings.

Response to Comment 40-4

As described in the Reclamation Plan given in Appendix B of the Draft SEIS and Appendix C of the Final SEIS, the operator would be required to reclaim the DTF concurrently with development of new cells so that even partially completed cells would be undergoing revegetation. This practice would minimize erosion of unvegetated surfaces, aid in stabilizing the DTF water balance, and promote drainage. Section 2.5 of the Final SEIS describes the reclamation goals. The operator would use test plots to refine reclamation procedures and conduct monitoring during the life of the operation. The borrow areas would be regraded and reclaimed as shallow water bodies with wetlands along the perimeter. This configuration would provide a habitat type that does not exist at present within the project area.

Response to Comment 40-5

The 1992 FEIS discusses the potential impacts to wildlife. This discussion was considered sufficient. All action alternatives minimize the extent of potential impacts to stream channels and adjacent riparian habitat, which would subsequently minimize the potential physical impact to habitat in the riparian corridors.

Response to Comment 40-6

Section 2.3.6 of the Final SEIS describes the tailings slurry pipeline as a 14-inch high density polyethylene (HDPE) pipeline with a 20-inch casing for spill containment. The tailings slurry would be more erosive than petroleum. The erosive nature of the tailings slurry is not be expected to result in a catastrophic spill, however, because the pipeline would be double-walled, and flow sensors would be used to detect any leaks into the secondary spill containment casing. Upon detection of a leak, an automatic shutdown mechanism would activate to stop the slurry transfer until repairs could be made. A catastrophic spill from the slurry pipeline would require an external event, such as a vehicle or a major landslide impacting the pipeline, that would simultaneously breach the primary and secondary casings. The likelihood of an external event causing a catastrophic spill is independent of the physical characteristics of the pipeline contents.

Response to Comment 40-7

Anadromous fish do not occur on the streams where long-span, low-arch, bottomless conduits would be used to construct road crossings. These streams are above a naturally occurring anadromous fish barrier on Sherman Creek approximately 1,000 feet upstream of Lynn Canal. The use of bridges for haul road crossings on upper Sherman Creek and Ivanhoe Creek has been incorporated as an option under Alternative D. Please see the response to Comment 5-2.

material be used instead of grass for soil stabilization. This will hold soils in place and prevent erosion and does not attract wildlife. 40-8 (cont.)

Waste Rock

The JAS recommends that a greater percentage of waste rock be backfilled to reduce the size and height of the waste rock pile. Doing this would reduce the visual and physical impact of this material. 40-9

Metal Accumulations

The DEIS discusses using body tissue measurements to determine if the bioaccumulation of metals is has an effect on resident mammals. This option was eliminated from the monitoring plan because of the need to sacrifice animals. The JAS recommends that the Forest Service look into other indirect methods for measuring metal concentration. For example, some researchers have used mother's milk as a method to estimate body load and concentrations of lipid soluble contaminates. Other indirect measure for some types of metals can utilize claw (nail) clippings or blood samples. A literature search for other indirect measurement techniques should be conducted before the option of determining metal affects the mammal population is discarded. 40-10

Reclamation and Closure

The goal of a successful reclamation activity should be for the re-establishment of a diverse ecological community that can support a variety of wildlife. To meet this goal, reclamation should require the establishment of a diversity of plant and habitat types. Revegetation should include replanting of forbes, grasses, and conifers. Natural regeneration should be used on a minimal basis. Large disturbed areas are prone to invasion by non-native species and are not comparable to undisturbed areas in species composition. For example, natural regeneration in large clear-cut areas in Southeast Alaska can result in a higher ratio of Western Hemlock to Sitka Spruce because of the Hemlock's tolerance for shade. 40-11

Conclusion

The DEIS contains significant omissions and fails to consider adequately cumulative impacts. The Juneau Audubon Society believes that these problems must be addressed before the DEIS is finalized. Of paramount importance is the lack of discussions on the cumulative effects of possible developments - development that would not proceed without the Kensington Mine project. 40-12

Sincerely Yours,

Chris Kent
Conservation Chair
Juneau Audubon Society
P.O. Box 21725
Juneau, AK 99802-1795

Response to Comment 40-8

Mortality as a result of vehicular traffic is not expected because the speed limit on the haul road would be significantly lower than that of a typical highway. Using grasses as part of the revegetation seed mixture would allow the process of succession to begin with the initial seeding, rather than waiting until final closure.

Response to Comment 40-9

Please see the response to Comment 5-5.

Response to Comment 40-10

The projected levels of mine drainage discharge would meet all State and Federal water quality standards, including those for metals. These standards have been developed to prevent toxic effects to both humans and wildlife and to prevent the degradation of ambient water quality. Comments regarding the monitoring program for the bioaccumulation of metals have been noted. The Forest Service could require a more intensive monitoring program than the current proposal, if potential impacts were expected in the future.

Response to Comment 40-11

The focus of the Reclamation Plan is to reestablish vegetation communities within the site that are stable and support wildlife habitat. The Reclamation Plan calls for seeding vegetation on all disturbed surfaces, except for rock faces, as well as for allowing natural revegetation. At the same time, site conditions would drive the process of succession, because the plants best adapted to site conditions would become established. Plant communities are expected to change as the soil condition improves and light regimes change.

Response to Comment 40-12

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Roger Birk, EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, Ak 99801

Subject: Kensington Mine DEIS

Dear Mr. Birk:

At the recent DEC work-shop the Montgomery-Watson person said or implied that they were going to do monitoring of the stream, I believe, and they had data going back to the first studies of the Kensington project. I am not clear about a monitoring plan of Sherman Creek and Ophir Creek fauna and flora which, if proposed, should not follow in the foot-steps of a previous plan of the Kensington and was doomed to failure. MW advanced the idea that they would quantivatively monitor populations and the assumption was made, or was expected to be made by the reader--in my opinion, that they would indeed, be able to detect change should change occur. The enclosed letter to Phil Millam of EPA of February 10, 1996 was about a perhaps similar attempt of Coeur. MW had presented Power-of-Test analysis for of individuals numbers of several species estimated in the study area of stream and interidal zone during the pre-operation stage. Their data (baseline data) of the proposed analysis would reveal valid quantitative changes in populations, so their implication went, at least the way I understood it.

The fact is that they will not be able to detect statistical quantitative differences in the numerical data of populations sizes that they have (except for catastrophic changes which don't need the sophisticated procedures they propose, i.e., Power-of-Test) because they have not been collecting data long enough to know what the within season and annual variations in the populations are.

To make the appearance that they can monitor effects on the basis of quantitative monitoring of wild populations with the data base they have or can get before operations begin is simply for either propaganda purposes, or wishful thinking, and certainly not science.

Perhaps I have mistaken intentions here but this matter should be cleared up. I have some qualms about my Millam letter (enclosed) and it may not apply at all here but I will leave that for others to decide at the present time. As you may know, or may not know, serious mistakes have been made in these matters before which escaped, the system almost, but thanks to non-government organizations, did not (Enclosure # 2.) 41-1

Richard Myren
3320 Fritz Cove Road
Juneau, AK 99801

789-9165
4/7/97

file_Coeur4

CC:Chambers
Baker
Sierra Club

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RESPONSES TO COMMENTS
Commentor No. 41: Richard Myren

Response to Comment 41-1

The potential for having a Type I or Type II statistical error (i.e., having either a false positive or false negative result) decreases with increasing sample size and sample adequacy. Because most biological and natural systems exhibit naturally high variation in measured attributes, monitoring programs of macroorganisms often lack the statistical power to detect small changes from baseline conditions at a high confidence level. For this reason, the environmental monitoring program has been designed to detect changes in both source contaminants and target organisms. Table 2-3 of the Final SEIS outlines the monitoring progrnm and proposed sampling intensity for both biological and non-biological constituents. Potential sources of contnmination would be sampled more intensively, both temporally and by number of samples, than target orgnnisms. For example, water quality constituents both above and below proposed dischnrges would be monitored intensively (e.g., bimonthly in some cases), as required by the NPDES permit. This snmpling progrnm would establish a data base that would facilitate detection of small changes in water quality discharges at a high statistical confidence level. The program is designed so that potential contamination would be detected before impacts to organisms or habitat occur. Other ecological constituents would be monitored less frequently, but at levels sufficient to confirm that impacts were not occurring. The Forest Service and EPA, or other appropriate agency, would require modifications to the monitoring plan if warranted by changes in site conditions or the mine operation.

Enclosure #1

Mr. Phil Millam
Dir. of Office of Water
U.S. Environmental Protection Agency
1200 6th Ave.
Seattle, WN 98101

Dear Mr. Millam:

I have had difficulty with the Coeur's quantitative monitoring proposal because I fear that it might become an avenue for Coeur to escape from the responsibility of mine effects sometime in the future. I have been a devotee of the promise to keep mine wastes contained and have become involved in this proposal of Coeur.

Quantitative methods which by definition are powerful, and when rigidly applied there is no escape from the truth. The problem is, however, to design sampling which is rigorous, sustainable while maintaining scientific integrity in the field over many years, without bankrupting the backers. Those who can usually afford such studies are the potential wrong doers and may withdraw funding when results threaten the profit margin. The cigarette manufactures give examples of how corporations practice science and avoid responsibility, though I see no evidence that the present intentions of Coeur are not the most honorable, constructive and valuable.

My fears, perhaps unfounded, are that the problem of the monitoring programs, as proposed, could shift the condition or burden-of-proof of a water quality violation upon the ability of quantitative monitoring program to demonstrate the occurrence of adverse effects associated with it. I was impressed with the vigor of the proposal, its inventiveness, that is, facing $(1-\beta)$ in her den. However, words, symbols and numbers are cheap. To make a program a reality, that is to spend a lot of money, fill the site up with biologists and generate solid peer reviewed reports could only result, instead of what was intended, in a feeding grounds for corporate lawyers looking for ways of showing nothing was really proven. In the meantime the mine continues operation--the history of the world.

Dave Mertz initially suggested I write you over my concerns about the monitoring plan of Coeurs. I had briefly looked over the power-of-the-test graphs observing one, in particular, of adult pink salmon escapement. To present, for example, a species with an annual adult population that may vary by a factor of 27 makes detecting an effect

from a pollution violation, even on a scale of catastrophic change, somewhat questionable (see example in the attachment). Catastrophic changes may become obvious by definition but for pink salmon adults populations catastrophic change is subjective. Sub-lethal chronic effects in the biota simply are not going to be detected given the time scale of the mine operation and the time horizons between inadequate baselines and the during construction and operational periods of the mine.

Much of the proposed plan, as I see it, depends upon comparisons between abundances, coverage or other indices in the baseline period and the period after the baseline, the construction and post-construction periods. It is not possible to have credible results with such limited baseline data collected in only 1992 and 1995.

This criticism does not mean that the proposed monitoring plan does not have considerable value to both sidesthat is in keeping outlandish charges of an effect or no effect under control when $(1-\beta)$ is demonstratedly powerfull. If many of the studies are carried out enough information will be gathered so as to be able to at least identify subjectively catastrophic changes that might be due to some mine effect especially if such changes coincide with changes in mine discharges, and for example, combined with ancillary information such as from tissue samples.

You may wonder why I am so critical. For three reasons, some my own bias. The first is that I happened to be the person who found that the previous consultants on oceanography erred in determining mixing rates of the effluent. They had mistakenly figured Lynn Canal to be ten times smaller than it really was, and their 20 day flushing rate should have been 200 days! The fact that such an error got though publications and reports (and into the draft EIS, I believe) and past all of that criticism before being identified brought me to wonder how serious the planners of the mine were at that time. Needless to say, Cosur seems to have turned a new leaf, the promises so good and responsible toward the environment that they must be taken seriously.

The second reason is in the human laboratory, in which I have worked and watched (though, until recently, I did not identify it as such) the cunningness of man. The Forest Service for over three decades straddled the fence with an act of overtly maintaining that the power of salmon spawning escapement comparisons to detect logging effects was high hence if such effects--if present, would be detected and rules of logging changed, and the act of actually knowing the power to detect logging effects was low and logging effects would not be detected, hence the rules of logging would not have to be changed. Because there was no real data then the changes in the rules of logging, when made, were necessarily cosmetic, arbitrary, and weak in the sense that it was not clear how they affected fish. The Forest

Service upon making such changes would then return to the position that the power to detect effects was adequate and hence, because no effects were observed, concluded therefore such changes in the rules were effective. Such circularity of argument continued for over three decades. Because the Forest Service used this ploy it contributed to much streamside timber being cut and an adverse effect upon fish habitat which will grow in intensity over decades and require centuries, if ever, to recover. To cultivate the kind of conditions for these kinds of games to develope should not be allowed.

The third reason is that I have worked for the last ten years of my professional life as a marine biologist on quantitative sampling in the intertidal zone, particularly, in Port Valdez for the NMFS Auke Bay Laboratory. Whatever my faults in the success of the biology in that enterprise, nevertheless I can tell you with certainity that annual variations in population sizes of intertidal organisms, e.g., clams, mussels, and percentage coverage, and indices, cannot be assumed to be sufficient to make the judgement between pre-development or baselines and development periods with baselines to measure annual variability containing only two years observations and expect meaningful results and, to be very generous, short of perhaps a decade. Such comparisons will tell us nothing relevant to the objectives of determining changes most of the time, in my opinion, below catastrophic levels of change, though there may well be significant ancillary works, and knowledge increased from qualitative studies in the meantime.

Finally, over my life, I have seen what I consider marine and freshwater biologists prostituting themselves--after all they, (we?) too have to eat. The institutions such as University of Alaska, University of Washington, others, the State of Alaska, and within my own agency all contain them. Within institutions the less the corruption the greater the insulation from the political process and the exigencies of funding, in my opinion. Outside public institutions it can be worse. In our society and in the end science and industry almost always become married either perfect, or by "shotgun" and the natural environment is further degraded. It is the history of man.

Suggestions:

If sampling is to be done, and not to diminish what is proposed and that some of it turns out to be feasible, then perhaps the following should also be considered.

Monitoring the density and growth rates of specifically identified individual barnacles through their life histories if proper populations can be found. Plastic overlays on specifically identified locations can provide rapid re-identification of individuals between samples, new recruitment to the site, and mortality, as well as the growth rates. (I suggested this in the talk with Bill Blaylock of Montgomery Watson, 1/31/96.)

Quantitative assessment of herring spawn on *Fucus* and substrate in the vicinity 1/2 mile each way from Sweeny Creek. A real quantitative assessment, say of coverage of spawn (density per surface area) and amount of area would obtain seasonal variances of the spawn for baseline, construction and operation periods. The herring stock in the vicinity of Berners Bay I am told is one of the last major stocks in Lynn Canal and a major fish resource of this region. At the very least such would be a significant contribution to understanding a little bit of the herring biology around the mine site.

There is much good in the proposals which will allow a better understanding of the environment below the proposed mine. I would encourage these studies but intellectually not be cowed by the sound and fury of the real and supposed quantitative merits. Keep ones eyes on the pipe and what is in it and what is measured there, and base actions on that, and not on what might or might not be *effects* downstream.

Sincerely,

Richard T. Myren
3320 Fritz Cove Road
Juneau, Ak. 99801
February 10, 1996

attachments
file__Coeur2

cc: Torok
Mertz
Blaylock
Beryl
Chambers

Enclosure #2

DECLARATION OF DICK MYREN

I, Dick Myren, do declare as follows:

1. I am a retired fishery research biologist from the National Marine Fisheries Service (NMFS) laboratory located at Auke Bay, Alaska. I received a general doctorate degree from Cornell University in 1964 under Dr. John Barlow, Professor of Oceanography. My doctoral dissertation was on pollution in a Long Island, N.Y. estuary involving biological oceanography. Prior education included two years in graduate school at the University of Washington School of Fisheries with several courses in physical and chemical oceanography. Employment since my doctorate was primarily in baseline monitoring studies at Port Valdez in conjunction with the Trans-Alaska Pipeline and the tanker deballist facility. I have one major publication on these studies and one in draft at the NMFS Auke Bay laboratory.

2. On the morning of March 18, 1992, I called Tom Kessler of Kessler and Associates, the Forest Service's oceanography consultant for the EIS, to question him about his work on the mixing zone and oceanography near Point Sherman, Lynn Canal. He agreed the calculation on page 5 of Technical Memorandum #4, Lynn Canal Flushing and Submarine Waste Water Discharge, Jan. 4, 1992, was wrong. We agreed that the flushing rate as he defined it, and as calculated, was in error by a factor of 10. The 20 day flushing rate should have been approximately 200 days, and the 12 day rate should have been approximately 120 days. These figures are derived simply by dividing 65,000,000,000 cu. meters by 4,000 cu. meters/sec. and by 12,000 cu. meters/sec.

3. The incorrect flushing time of 20 days is also quoted in the FEIS on page 4-39, and is used as the basis for the calculations in Table 4-16 on page 4-40.

Dated this 19th day of March, 1992.

Dick Myren

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

APR 0 7 1997

Reply To
Attn of: OW-130

Gary Morrison
Forest Supervisor
USDA Forest Service, Chatham Area
204 Siginaka Way
Sitka, Alaska 99835

ATTN: Juneau Ranger District, Roger Birk

RE: EPA Comments on Kensington Gold Project Draft Supplemental Environmental Impact Statement

Dear Mr. Morrison:

The Environmental Protection Agency (EPA) has reviewed the Kensington Gold Project Draft Supplemental Environmental Impact Statement (Draft SEIS). The Draft SEIS evaluates the modified proposal of Coeur Alaska, Inc. to develop the Kensington mine near Lynn Canal, 45 miles north of Juneau, Alaska.

An EIS addressing the original Kensington project and associated alternatives was completed by the Forest Service in 1992. The preferred alternative selected by the Forest Service consisted of an underground gold mine, ore processing facilities, including onsite cyanidation, a tailings impoundment in the Sherman Creek valley, marine discharge of process wastewater, and various support facilities, including use of liquefied petroleum gas (LPG) for power generation.

Coeur Alaska's revised proposal, evaluated in the current Draft SEIS, includes the following project modifications: offsite transport of flotation concentrate, thereby eliminating onsite cyanidation, dry surface disposal, and partial backfilling of, tailings, no marine discharge of process wastewater, use of diesel fuel for power generation, and modifications to the facility layout.

Current project modifications address issues raised in conjunction with the original Kensington proposal including those evaluated in the Technical Assistance Report prepared by EPA in 1994. The TAR focused on water quality, effluent discharge, hydrologic, and habitat-related impacts associated with construction and operation of the previously proposed tailings impoundment, and use of cyanide leaching.

The proposed Kensington Gold Project requires a National Pollutant Discharge Elimination System (NPDES) permit from EPA. Because the project is defined as a new source under the NPDES regulations (40 CFR 122.2, and 122.29) and a major federal action under the Clean Water Act [Section 511 (c)(1)], EPA is required to comply with NEPA prior to final action on the NPDES permit. EPA is therefore a cooperating agency (by Memorandum of Understanding with the Forest Service) on the SEIS and will issue a Record of Decision subsequent to issuance of the final SEIS and in conjunction with the NPDES permit decision.

As a cooperating agency on the SEIS we have provided support, through our third-party contractor, to assist in the preparation of the SEIS and related documents, and have provided comments on the scope of the SEIS, and the preliminary drafts of the draft SEIS. We have also participated on the Forest Service SEIS interdisciplinary team. We appreciate the efforts of the Forest Service to solicit our participation in preparation of the draft SEIS.

EPA has coordinated preparation of the Kensington Draft NPDES permit with the Draft SEIS. Concurrent public hearings for the draft SEIS and draft permit were recently held in Juneau and Haines, Alaska.

EPA is also independently responsible for review of the SEIS pursuant to Section 309 of the Clean Air Act. Through this review process EPA provides a rating of the overall environmental impact of the action and the adequacy of the Draft SEIS.

Our detailed comments on the Draft SEIS (by page) are enclosed, and summarized (by category) below. We previously provided comments during the Draft SEIS scoping and preparation phases pertaining to SEIS alternatives, water quality and effluent discharges, hydrology, geochemistry, wetlands, and air quality issues. We are providing further comments on these and other remaining issues.

<u>Evaluation of Available Alternatives</u>:

EPA has concurred with the Forest Service in the identification of Alternative D (Modified DTF Design) as the preferred alternative in the draft SEIS. For geotechnical safety purposes, we support the incorporation of the structural berm around the exterior shell of the DTF, as identified under that alternative. Additional changes or refinements to the preferred alternative, as determined by the participating agencies, should be identified in the Final SEIS to support the respective Record's of Decision. To facilitate this, public and agency comments on the Draft SEIS need to be considered and the Final SEIS should further evaluate any feasible project component options which may be environmentally preferable. 42-1

RESPONSES TO COMMENTS
Commentor No. 42: U.S. Environmental Protection Agency, Region 10, Philip G. Millam

Response to Comment 42-1

Thank you for your comment. Please see the response to Comment 3-1.

Certain impacts described in the Draft SEIS represent environmental tradeoffs resulting from the new proposed project configuration. The new proposal favorably addresses water quality impact issues, while resulting in the greater visual impacts, and vehicular and fugitive emissions associated with dry tailings disposal. The impacts associated with the proposed use of diesel fuel for power generation do not represent such a tradeoff (see below comments related to this).

In general, where impact issues remain due either to tradeoffs or feasibility considerations, the agencies need to assure that mitigation addressing those, and the overall issues, be incorporated into the preferred alternative. Included among these, in addition to those addressing water quality and geotechnical issues, are reclamation/re-vegetation measures, spill prevention and control measures (marine and fresh water), and air and fugitive dust emission control measures (see below section entitled "Mitigation/reclamation"). 42-2

Use of Diesel Fuel for Power Generation:

Increased air emissions and spill potential associated with the proposed use of diesel fuel for power generation (vs. LPG), in additional to other uses, was identified as a significant issue. The Final SEIS should further address the feasibility of project use of LPG for power generation and should also further describe the basis for spill risk factors (including the effect of any mitigating/safety factors), associated with the trucking of a diesel fuel vs. construction and operation of a diesel fuel pipeline. 42-3

Effluent Discharges:

The Draft SEIS discloses impacts associated with project-related discharges subject to NPDES authorization and provides information necessary to support the NPDES review. EPA has coordinated the preparation of the Draft NPDES permit with the Draft SEIS. We have requested, in our enclosed detailed comments, additional clarifications and information pertaining to parameters specific to these discharges. Additional treatment of effluent from the DTF is considered a feasible option if found necessary to assure project compliance with water quality standards. 42-4

Visual Impacts:

As indicated in the Draft SEIS, the two borrow pits facing Lynn Canal would represent a significant visual impact, and may not conform with Forest Service visual quality objectives. The DTF raises similar concerns. It remains unclear to what extent 42-5

Response to Comment 42-2

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

Response to Comment 42-3

Both LPG and diesel fuel are feasible alternatives for the project. Tables 2-5 and 2-6 of the Final SEIS have been modified to include additional information to facilitate comparison of the effects of diesel fuel and LPG for power generation. This information includes the risks of spill events and levels of air emissions, as well as specific mitigation measures, for each alternative. When the Kensington Gold Project was a Joint Venture between Echo Bay and Coeur Alaska, LPG was considered as a fuel source for both the Kensington Gold Project and the Alaska-Juneau (A-J) Project. When Coeur Alaska became the sole owner of the Kensington Gold Project and its involvement in the A-J Project ended, the unit costs of using LPG solely at the Kensington Gold Project became higher than diesel fuel (as much as 7 percent higher). The Forest Service Record of Decision provides additional rationale for selecting diesel fuel.

Response to Comment 42-4

Section 2.3.5 of the Final SEIS acknowledges the feasibility of DTF effluent treatment similar to the mine drainage treatment system, if necessary.

Response to Comment 42-5

Mitigation for the borrow pits primarily consists of concurrent reclamation. This would shorten the time period of the visual impacts at the site.

the mitigation measures cited address this issue; they will require further attention in the Final SEIS. 42-5 (cont.)

Mitigation/reclamation:

The discussion of mitigation measures needs to be further developed in the Final SEIS to disclose the range of mitigation which could be employed to address issues, remaining impacts (after application of mitigation measures), to refine the preferred alternative, in part through incorporation of mitigation measures, and to support the agency RODs. The Final SEIS should disclose mitigation in terms of avoidance, and minimization of impacts, rectifying, reducing or elimination of impacts, and compensation for unavoidable impacts. We have described in our enclosed detailed comments how the mitigation discussion can be organized to serve these purposes. 42-6

Importantly, the participating agencies need to fully evaluate short and long-term reclamation measures necessary to address the SEIS issues raised, with the goal of minimizing project-related impacts, including those to habitat values, prior to issuance of the RODs. 42-7

Included among the additional stipulations which may be incorporated into the federal permits, in addition to those related to reclamation, are measures aimed at: (1) maximizing the backfilling of tailings and minimizing the footprint of the DTF, (2) reducing the risks associated with off loading of diesel fuel at the marine terminal, and the transport of diesel fuel, and (3) reducing potential hydrologic impacts associated with proposed water diversions. 42-8

Cumulative Effects:

Cumulative impacts from the Jualin Mine, Goldbelt Project, and Juneau Access Road are discussed under the individual resource categories in Chapter 4 of the Draft SEIS. The SEIS should disclose the overall cumulative effects resulting from the incremental impact of the Kensington Gold project, when added to other reasonably foreseeable proposals. We suggest that the degree of interconnectiveness between these other potential projects and Kensington, as well as the level of available information bearing on a project, drive the level of analysis warranted. In particular, the Final SEIS should incorporate updated information relevant to cumulative effects from the Goldbelt Draft EIS currently being prepared. 42-9

The Juneau Access Road proposal is a broad action which in itself would precipitate a number of indirect and cumulative effects. The EIS for that action appears to provide the better decision-making framework for discussion of those effects than 42-10

Response to Comment 42-6

Table 2-2, which has been added to the Final SEIS, includes all mitigation measures for each alternative by resource area. These measures specifically are intended to avoid, minimize, and reduce impacts. They generally address the issues identified during scoping for the 1992 FEIS and the SEIS. The table also identifies the responsible agency and the mechanism for requiring the mitigation measure (e.g., Forest Service and the final Plan of Operations).

Response to Comment 42-7

Table 2-2, which has been added to the Final SEIS, presents components of the Reclamation Plan that involve mitigating potential impacts. At closure, all structures would be removed, except the DTF. Disturbed areas would be regraded and revegetated with native plant species and recruitment. Sediment ponds would remain as open water. The DTF would undergo concurrent reclamation.

Response to Comment 42-8

The Plan of Operations includes the operator's commitment to maximize backfill. Table 2-2 in the Final SEIS also includes this mitigation measure. In addition, Table 2-2 identifies additional mitigation measures for the offloading of fuel from barge to shore and onsite transportation and storage. These measures would be implemented by ADEC and the Coast Guard through the C-Plan and EPA through the SPCC Plan. The diversions above the process area and DTF are not expected to affect the Sherman Creek watershed. Under Alternatives B through D, instream diversion would be limited to Ophir Creek. This impact is unavoidable in constructing process area facilities. The Ophir Creek diversion would be removed at closure and the natural channel reconstructed.

Response to Comment 42-9

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes all of the cumulative impacts associated with the Kensington Gold Project.

Response to Comment 42-10

Please see the response to Comment 42-9.

the Kensington SEIS. However these effects, as they relate to the Kensington Project, should be discussed in the SEIS to the extent the discussion is not speculative. 42-10 (cont.)

Cumulative effects could also potentially be addressed by the City and Borough of Juneau through evaluation of the Berners Bay area as an Area Meriting Special Attention under the Coastal Zone Management Act. This would provide the planning framework for addressing the cumulative effects of these and other potential actions, and overall policy direction. 42-11

Summary, and Draft SEIS Rating:

EPA has rated the Draft SEIS as EC-1 ("Environmental Concerns-Adequate"). A summary of the EPA EIS rating system is enclosed for your reference. Kensington project modifications favorably address issues related to water quality, hydrologic, and habitat-related impacts. Our remaining environmental concerns are based primarily on the increased air emissions and spill risks (affecting water quality) associated with the increased use of diesel fuel, adverse visual impacts associated with the project components, and the feasibility of mitigation and reclamation measures to address overall short and long-term impacts. EPA also remains concerned about the need to minimize potential water quality impacts associated with project discharges, through appropriate project design and implementation measures. The Final SEIS should provide the additional information we have requested to further support the evaluation and comparison of project component options and overall mitigation measures necessary to address the issues raised. 42-12

Thank you for the opportunity to provide our comments on the Draft SEIS. Rick Seaborne is coordinating EPA's review of the Kensington Gold Project SEIS and may be contacted as needed for additional information at (206) 553-8510.

Sincerely,

Philip G. Millam
Director
Office of Water

Enclosures

Response to Comment 42-11

Thank you for your comment.

Response to Comment 42-12

Section 4.12 of the Final SEIS has been modified to include additional information on the use of diesel fuel and mitigation measures. The visibility issue cannot be fully mitigated until completion of reclamation; however, minimizing the size of the DTF by maximizing backfill would provide some mitigation. Section 2.5 of the Final SEIS has been modified to include a complete summary of all mitigation measures under each alternative.

U.S. Environmental Protection Agency, Region 10 (EPA)
Page-Specific Comments on Kensington Gold Project
Draft Supplemental Environmental Impact Statement (Draft SEIS)

1. Page vi, Purpose of and Need for Action, second paragraph, last sentence: Revise the sentence to read as follows: "As cooperating agencies, EPA and the Corps of Engineers will also issue RODs in conjunction with their respective permit decisions for the Kensington Gold Project." The respective RODs and permits would be issued concurrently. 42-13

2. Page xii, Aquatic Resources-Marine: The sentence which reads: "Discharges under Alternatives B and D would not affect Lynn Canal" should acknowledge the proposed domestic wastewater discharge. 42-14

3. Page xiv, Transportation: In the last paragraph, and on page 4-90, the relative potential tailings spill quantities from trucks vs. a pipeline should be compared in consistent terms (i.e. either tons or gallons). 42-15

4. Page xix: A list of appendices should be placed in the Table of Contents. 42-16

5. Page 1-1: Please revise first sentence (fourth paragraph) to read: "EPA and the Corps of Engineers are responsible for issuing RODs in conjunction with their respective permit decisions for the Kensington Gold Project." 42-17

6. Page 1-2, 1.1 Purpose of and Need for Proposed Action: Take out the "FEIS" acronym, which is incorrectly used. 42-18

7. Page 1-4, 1.4 Significant Issues: Increased air pollutants associated with burning of diesel fuel for power generation vs. liquefied petroleum gas (LPG) is included as a significant issue. The Final SEIS should address the feasibility of project use of LPG, and necessary mitigation measures to address this issue (also see subsequent comments pertaining to this). 42-19

8. Page 1-4, 1.5 Other Issues: Under the first bullet item, the second to last sentence reads: "Because cumulative effects are discussed in this Draft SEIS for all alternatives, this was not considered a significant issue." It would be more clear to state that although the issue did not drive the development of alternatives (i.e. because it was not identified as a "significant" issue during scoping), it is nevertheless addressed in the SEIS. The text should also clarify how this issue is further addressed in the Final SEIS, taking into account comments on the Draft SEIS. 42-20

Response to Comment 42-13

The Summary of the Final SEIS has been modified.

Response to Comment 42-14

The Summary and Section 2.3.5 of the Final SEIS have been revised to clarify that the DTF and mine drainage discharges would not enter Lynn Canal under Alternatives B and D. They also indicate that the sanitary discharge would be to Lynn Canal, with no adverse impacts.

Response to Comment 42-15

The Summary and Section 4.12.5 of the Final SEIS have been revised to include both the gallons and tons of tailings slurry potentially released from a pipe failure. A specific gravity of 2.7 g/cm^3 has been used for the tailings in the slurry.

Response to Comment 42-16

The table of contents for the Final SEIS has been modified to include a list of appendices.

Response to Comment 42-17

The introduction to Chapter 1 of the Final SEIS has been modified.

Response to Comment 42-18

The acronym has been deleted in Section 1.1 of the Final SEIS.

Response to Comment 42-19

Please see the response to Comment 42-3.

Response to Comment 42-20

Section 1.5 of the Final SEIS has been modified accordingly. The Final SEIS indicates that although cumulative effects were not considered a significant issue driving the development of alternatives, these effects have been documented for each resource. Also, please see the response to Comment 42-9.

9. Page 2-30, 2.5 Mitigation and Monitoring: The discussion of mitigation measures needs to be further developed for the purposes of disclosing the range of mitigation which can be employed to address issues, remaining impacts (after application of mitigation measures), to refine the preferred alternative, in part through the incorporation of any additional necessary mitigation measures, and to support the agency Records of Decision (RODs). The Final SEIS should disclose mitigation in the context of the CEQ definition of mitigation at 40 CFR 1508.20, including avoidance, and minimization of impacts, rectifying, reducing or elimination of impacts, and compensation for unavoidable impacts. 42-21

It would be helpful to organize the discussion in such a way as to: (1) summarize how impacts have been avoided, or minimized through project planning and design features, and through the development of alternatives, (2) summarize additional mitigation measures to be employed by the project proponent, and/or to be required through permit requirements or authorizations, by what authority, and (3) identify and evaluate any additional potential mitigation necessary to address remaining issues identified through the SEIS process. The mitigation discussion should encompass measures to avoid, minimize, rectify, reduce or eliminate impacts, and to compensate for unavoidable impacts. 42-22

Reclamation measures should also be referenced in the context of mitigation sequencing, as reclamation by definition constitutes mitigation. The participating agencies need to specifically evaluate reclamation measures (both during operations and over the long-term) necessary to address the SEIS issues raised, with the goal of minimizing project-related impacts, prior to issuance of the RODs. 42-23

The Draft SEIS does not indicate under which authority many of the listed measures would be required. 42-24

The Spill Prevention Control and Countermeasures (SPCC) Plan should be included as an appendix to the Final SEIS. 42-25

The discussion of air quality mitigation measures is very limited and needs to be further addressed. 42-26

Included among the stipulations which may be incorporated into the federal permits, in addition to those related to reclamation, are measures aimed at: (1) maximizing the backfilling of tailings and minimizing the footprint of the DTF, (2) reducing the risks associated with off loading of diesel fuel at the marine terminal, and the transport of diesel fuel, and (3) reducing potential hydrologic impacts associated with proposed water diversions. 42-27

2

Response to Comment 42-21

Please see the response to Comment 42-6.

Response to Comment 42-22

Please see the response to Comment 42-6.

Response to Comment 42-23

Please see the response to Comment 42-7.

Response to Comment 42-24

Table 2-2, which has been added to the Final SEIS, lists the implementing mechanism and agency for each mitigation measure.

Response to Comment 42-25

The SPCC Plan and C-Plan are both very extensive documents and are not included in the Final SEIS. Sections 2.5 and 4.12 of the Final SEIS highlight specific mitigation measures presented in these documents.

Response to Comment 42-26

A new table, Table 2-2, in the Final SEIS summarizes mitigation measures for air quality. These measures were considered in predicting air resource impacts for each alternative in Section 4.1 of the Final SEIS. Also, please see the response to Comment 42-3.

Response to Comment 42-27

Please see the response to Comment 42-6.

10. Page 2-39, 2.5.3, Implementation of Mitigation and Monitoring: The second sentence should be revised to indicate that the Final SEIS also includes (i.e. will include) the supporting documentation of mitigation measures. See previous comment regarding mitigation measures. 42-28

11. Page 2-40, 2.6 Identification of Preferred Alternative: The final SEIS should identify and describe a preferred alternative which includes any necessary changes (e.g. to components) as well as additional mitigation measures as determined by the agencies. EPA would prefer that, to the extent possible, further necessary changes in, and/or refinements to, the preferred alternative, as determined by the agencies, be identified in the Final SEIS, to support consistency between that Final SEIS agency preferred alternative and the agency RODs. 42-29

12. Pages 2-40 to 2-46, 2.7 Comparison of Alternatives: The Final SEIS should provide all information necessary to fully evaluate any project component option, included within any alternative, which may be environmentally preferable to a component option within the proposed action. Among those project components listed in Table 2-4, Summary of Potential Impacts of Each Alternative by Significant Issues the following project component options may be environmentally preferable to those included within the proposed action, by significant issue: (1) air quality issue - use of LPG vs. diesel for power generation (to greater extent), use of diesel pipeline to process area (to minor extent), use of tailings slurry pipeline to the dry tailings facility (DTF) vs. trucking (to minor extent) all result in lower air emissions, (2) spill potential from increased use of diesel fuel - use of LPG vs. diesel for power generation (to greater extent) and use of tailings slurry pipeline to DTF vs. trucking (to minor extent due to less diesel fuel usage) reduce potential spill hazards associated with transporting of diesel fuel, (3) visual impacts - Alternative A (including a tailings impoundment) would have less visual impact overall than the alternatives which incorporate the DTF, and associated exposed borrow pits, more exposed roads and processing facilities, additional Comet Beach facilities, and increased air emissions. 42-30

Impacts associated with certain of the proposed project components represent direct environmental tradeoffs (i.e. increased visual impacts, vehicular and fugitive emissions), principally to the benefit of addressing water quality issues. Other impacts do not appear to be so related (i.e. do not represent a direct tradeoff of one environmental 42-31

Response to Comment 42-28

Section 2.5.1 of the Final SEIS has been modified to reference Table 2-2 of the Final SEIS. This table summarizes all mitigation measures. Also, please see the response to Comment 42-6.

Response to Comment 42-29

Thank you for the suggestion. The Forest Service Record of Decision identifies the selected alternative and presents all mitigation measures.

Response to Comment 42-30

Tables 2-5 and 2-6 in the Final SEIS have been modified to include more data on the relative impacts of each alternative by resource and significant issue. Table 2-2 in the Final SEIS presents mitigation measures.

Response to Comment 42-31

Please see the response to Comment 42-30.

issue to the benefit of another), principally those associated with the use of diesel fuel for power generation, and the trucking of tailings slurry and diesel fuel vs. the use of pipelines. 42-31 (cont.)

EPA has concurred with the identification in the Draft SEIS of Alternative D as the preferred alternative. We believe however that the Final SEIS should provide additional information to assess the feasibility of use of LPG for power generation, given the significance of the above-cited related issues, as well as additional information on the basis for the spill risk factors (including the effect of any mitigating/safety factors), and sediment production associated with trucking of diesel fuel and tailings vs. construction and operation of diesel fuel and tailings slurry pipelines. 42-32

The above will provide additional information bearing on the selection of the preferred alternative in the Final SEIS. Where impacts issues remain due to tradeoffs or feasibility factors, the agencies need to assure that mitigation addressing those, as well as the overall issues, be incorporated into the preferred alternative. Included among these, in addition to those addressing water quality and geotechnical issues, are reclamation/re-vegetation measures, spill prevention and control (marine and fresh water) measures, and air and fugitive dust emission control measures. Also see above comment regarding how the overall mitigation discussion should be organized. 42-33

Also, also spill risks and impacts to the marine environment associated with LPG vs. diesel need to be better defined in the Final SEIS, to be reflected in the text and Table 2-4. 42-34

13. <u>Page 4-1, 4. Environmental Consequences</u>: In the second paragraph, correct "Technical Assessment Report" to read "Technical Assistance Report". 42-35

14. <u>Page 4-8, Production Activity</u>: Under fourth bullet item LPG turbines is incorrectly cited as a component of Alternatives B through D. 42-36

Also, the last paragraph, first sentence indicates that Alternatives B through D would use three 3.3 megawatt (MW) diesel generators. However as indicated on page 2-25, Power Supply, under Alternatives B through D, <u>four</u> 3.33 MW diesel generators would be located at the process area, and a 275 kilowatt (kW) generator would be located near Comet Beach. This section also indicates that, under Alternative D, an additional generator would be required at the DTF to supply power to the dewatering facilities. This discrepancy needs 42-37

4

Response to Comment 42-32

Please see the response to Comment 42-3.

Response to Comment 42-33

Please see the response to Comment 42-6.

Response to Comment 42-34

Sections 4.6 and 4.7 of the Final SEIS describe the risk and impacts of a spill event under each alternative. Table 2-5 in the Final SEIS summarizes the analysis, including mitigation measures. Also, please see the response to Comment 42-3.

Response to Comment 42-35

The introduction to Chapter 4 of the Final SEIS has been modified.

Response to Comment 42-36

Section 4.1 of the Final SEIS has been modified.

Response to Comment 42-37

Four diesel generators are proposed for the facility. Three would be operating at a time, and one would be on standby. Section 4.1 of the Final SEIS clarifies this issue. The generator located on Comet Beach was included in the modeling for Alternative B. Section 2.3.8 of the Final SEIS has been revised to indicate that an additional generator would not be required at the DTF site under Alternative D. Power would be transmitted via underground lines to the expanded facilities at the DTF. Therefore, the emissions under Alternatives B and D remain as presented in the Draft SEIS.

to be addressed as if affects the subsequent air modeling analysis. — 42-37 (cont.)

15. Page 4-9, Visual Quality: The last sentence of the third paragraph on the page indicates that the plume under Alternative B would be similar to the plume from the LPG-fired generators under Alternative A. It would seem that this statement should be supported by comparative VISCREEN modeling for Alternative A, or the basis for the statement otherwise provided. — 42-38

Also, under Table 4-7, Maximum Visual Impacts, visual impacts are presented in quantitative form. These numbers require some explanation or context to be meaningful to the reader. — 42-39

16. Page 4-10, Table 4-9: Combine the "EPA Standards" and "ADEC Standards" columns in the table. — 42-40

17. Page 4-11, Table 4-10: As indicated on page 4-5, modeled project emissions were compared to Prevention of Significant Deterioration (PSD) increments as a basis for determining the significance of air emissions impacts. Modeled nitrogen dioxide and particulate matter emissions from the project approach those respective maximum PSD increment levels. This should be acknowledged in the Final SEIS. — 42-41

18. Page 4-11, 4.1.5 Effects of Alternative D: Under "Production Activity" the emissions from Alternative D are stated to be less than those from Alternatives B or C. Does this conclusion take into account the extra diesel generator required under Alternative D?

Also, under 4.1.6 Cumulative Effects, the second sentence of the second paragraph states that "Annual average NO_X concentrations would decrease to below significant levels within 0.6 miles of the process area." Please clarify the interpretation of "significant", and the basis for citing 0.6 miles, in this context. — 42-42

19. Page 4-25, Effluent Quality: The last sentence should be corrected to read "...projected marine discharge." (strike "of tailings"). — 42-43

20. Page 4-32, Table 4-17, NPDES Effluent Limitations Discharge Quality (and related text): This table compares the projected water quality of discharges from outfalls 001 and 002 to the NPDES effluent limitations. For the projected discharge columns, a footnote should indicate that projected effluent values below the minimum level (ML) for a parameter should be viewed with caution (perhaps noting that the — 42-44

Response to Comment 42-38

Section 4.1.2 of the Final SEIS has been modified to include additional explanation.

Response to Comment 42-39

Please see the response to Comment 42-38.

Response to Comment 42-40

The columns for EPA and ADEC standards have been combined in Table 4-9 of the Final SEIS.

Response to Comment 42-41

Tables 4-14 and 4-15 in the Final SEIS facilitate comparison of projected emission levels to the prevention of significant deterioration (PSD) increments.

Response to Comment 42-42

Section 4.1.5 of the Final SEIS has been revised to indicate that Alternative D would not require an additional generator at the DTF and that the process area generators could supply power via underground power lines. Therefore, the emission rates under Alternatives B through D would be comparable and remain unchanged from the Draft SEIS.

A significant concentration in this context means an annually averaged modeled concentration of 1 $\mu g/m^3$. The 0.6 miles is the maximum distance from the facility to this location and is equivalent to 1 kilometer, the unit of measure used in the model. This type of analysis is performed for PSD modeling to determine if full impact modeling of the facility is necessary. Since this site is not a major source and PSD modeling is not required, this statement was made to show the small levels of impact from the facility.

Response to Comment 42-43

Section 4.4 of the Final SEIS has been modified.

Response to Comment 42-44

Footnote d in Table 4-18 in the Final SEIS (Table 4-17 in the Draft SEIS) notes that arsenic levels reported below 3 µg/L only accurately indicate that the actual value is below the method detection limit.

pollutant has been detected in samples, but the actual value has a high error margin). 42-44 (cont.)

With regard to arsenic, the footnote should indicate whether background levels in Sherman Creek are similarly above detection and below 3.0 ug/l. 42-45

With regard to copper, silver, and zinc, the text should clearly indicate that projected discharges for these parameters approach or exceed some of the limitations, but other factors have been considered in project design requirements, such as (1) downstream hardness is expected to exceed 200 mg/l under normal flow conditions, and (2) additional treatment at the DTF similar to that for Outfall 001 is a feasible option if compliance problems were to occur at the DTF. 42-46

Finally, a discussion of turbidity in effluent discharges (and the relationship to the TSS limitations) should be added to the text, based on our recent discussions. 42-47

21. Page 4-49, 4.6.4 Effects of Alternative C (Marine Discharge): Under "Wastewater Discharge", the marine aquatic impacts associated with Alternative C should be evaluated, as was done for the marine discharge under Alternative A. 42-48

22. Page 4-56, Water Quality: Under "Accidental Spills", the text references Section 4.13 as providing additional detail on the probabilities of an accident involving a spill. The correct reference should be to Section 4.12.4. The text also indicates that the probability of a spill from a pipeline is greater than that of an accident involving a tanker truck. The statistical probabilities of a diesel spill from either a tanker truck or pipeline (as cited in Section 4.12.4) appear indiscernible. As indicated in a previous comment, additional information should be provided on the basis for the spill risk factors associated with trucking of diesel fuel (and tailings) vs. operation of diesel fuel and tailings slurry pipelines and the effect of any mitigating/safety factors. 42-49

23. Page 4-57, Water Quality: Under "Accidental Spills", the second sentence states that the potential for a spill from the (tailings slurry) pipeline to reach Sherman Creek is small because the pipeline would be located adjacent to the haul road. This conflicts with statements on page 4-88 regarding the potential for spills of tailings from the pipeline to reach Sherman Creek, and Lynn Canal. 42-50

Also, the water quality impacts associated with a tailings spill need to be better defined. 42-51

6

Response to Comment 42-45

Footnote d in Table 4-18 of the Final SEIS (Table 4-17 in the Draft SEIS) states that arsenic has been observed in background samples from upper Sherman Creek at levels below the method detection limit. Please see the response to Comment 34-3.

Response to Comment 42-46

The levels in Table 4-18 of the Final SEIS (Table 4-17 in the Draft SEIS) show that predicted concentrations of several parameters, including silver, approach the draft NPDES permit limits. In addition, the subsection entitled, DTF Effluent, in Section 4.4.3 of the Final SEIS notes that copper and zinc levels exceed the monthly average limits at 50 µg/L. However, the actual hardness is expected to be more than 200 mg/L. This section also indicates that treatment similar to the mine drainage system would be feasible to meet permit limits if unexpected compliance difficulties arose.

Response to Comment 42-47

Section 4.4.2 of the Final SEIS has been modified to describe how the anticipated discharges would meet turbidity limits. By treating mine drainage and settling runoff to meet permit limits for total suspended solids, the operator should also comply with the State turbidity water quality standard. The final NPDES permit would include turbidity monitoring upstream and downstream of outfall 001 and downstream of outfall 002.

Response to Comment 42-48

Section 4.6.4 of the Final SEIS discusses the potential for marine impacts under Alternative C and references relevant discussion presented in Section 4.6.1 of the Final SEIS. Section 4.6.4 of the Final SEIS has been expanded to note that the yearly solids disposal would be less than 3 percent. Under Alternative C, the increase in sediment metals concentrations, including lead, would be less than 15 percent. Both of these increased levels are within natural variability. In addition, similar to Alternative A, the potential for significant increases in bioaccumulation under Alternative C is low because of the small projected changes in metals concentrations. Moreover, because of the nature of the combined mine drainage and DTF effluent discharge under Alternative C and the small size of the necessary mixing zone, aquatic life exposure to the effluent is not expected to cause significant effects.

Response to Comment 42-49

Section 4.12 of the Final SEIS was modified to provide the correct reference. Section 4.12 of the Final SEIS was revised to provide additional information on the basis for the spill risk factors associated with trucking of diesel fuel (and tailings) versus operation of diesel fuel and tailings slurry pipelines. This includes the effects of any mitigating/safety factors.

24. Page 4-65, 4.9 Cultural Resources: The first sentence states that "The scoping process did not identify potential effects on cultural resources as an issue." This sentence should be revised. Cultural resources may not have been considered a significant issue, in the sense it drove the development of alternatives, but it is an important issue requiring compliance with National Historic Preservation Act. The EIS process should be integrated to the extent possible with the provisions of Section 106 of the Act. The Act requires inventories within the defined area of potential effect, determinations of the potential for adverse effect, and any necessary mitigation in consultation with the State Historic Preservation Officer and the Advisory Council on Historic Preservation. This process should be better described in the Final SEIS, along with any updated information and consultations. 42-52

25. Page 4-66, Borrow Pits: The two borrow pits facing Lynn Canal as described will represent a significant visual impact, and would not conform with Forest Service visual quality objectives. The mitigation measures cited do not fully address this issue, and will require further attention in the Final SEIS. The DTF represents similar concerns and it remains unclear to what extent reclamation measures will resolve the issue. 42-53

26. Page 4-88, 4-89, 4.12.6 Cumulative Effects (related to transportation), and cumulative effects discussions (general): Cumulative impacts from the Jualin Mine, Goldbelt Project, and Juneau Access Road are discussed under the individual resource categories in Chapter 4 of the Draft SEIS. It is necessary to provide enough information to disclose the overall cumulative effects stemming the incremental impact of the Kensington Gold project, when added to these other "reasonably foreseeable" proposals. We suggest that the degree of interconnectiveness between other foreseeable projects and Kensington, as well as the level of available information bearing on a proposal, drive the level of analysis warranted. In particular, the Final SEIS should incorporate updated information relevant to cumulative effects from the Goldbelt Draft EIS currently being prepared. 42-54

The Juneau Access Road proposal is a broad action which in itself would precipitate a number of indirect and cumulative effects. The EIS for that action appears to provide the better decision-making framework for discussion of those effects than the Kensington SEIS. However these effects, as they relate to the Kensington Project, should be discussed in the SEIS to the extent the discussion does not become speculative. 42-55

Response to Comment 42-50

Section 4.12.5 of the Final SEIS states that a spill "could" reach Sherman Creek. This situation was used to present a worst-case impact that could result from a pipeline spill. The occurrence of such a scenario would be highly unlikely.

Response to Comment 42-51

Section 4.4.3 of the Final SEIS presents the potential impacts to surface water. Data from leachability tests on flotation tailings show concentrations of pollutants that are not appreciably above background levels in Sherman Creek. The primary potential impacts to surface water that would result from a spill of dewatered tailings from a truck or a ruptured pipeline are the physical impacts that would result from potential damming of the channel, resulting flooding, and erosion of the upper banks. Acute toxicity to aquatic organisms is not expected, but spawning gravels and feeding behavior of fish could be affected. Section 4.7.3 of the Final SEIS discusses these potential impacts.

Response to Comment 42-52

Sections 3.13 and 4.9 of the Final SEIS have been modified to include additional information on cultural resources.

Response to Comment 42-53

Some impacts cannot be fully mitigated. The operator is required to comply with the Forest Service visual quality objectives established for land use prescription. For the Kensington Gold Project site, the Visual Quality Objective during operation is Maximum Modification. Following closure, the objective is "Modification." Reclamation of the borrow pits and DTF generally represents the only feasible visual quality mitigation under Alternatives B through D.

Response to Comment 42-54

Please see the responses to Comments 42-9 and 18-1.

Response to Comment 42-55

Please see the responses to Comment 42-9 and 18-1.

We recommend that the City and Borough of Juneau also consider evaluation of the Berners Bay area as an Area Meriting Special Attention under the Coastal Zone Management Act, which would provide the planning framework for addressing the cumulative effects of these and other potential actions, and overall policy direction. 42-56

Response to Comment 42-56

Thank you for your comment.

SUMMARY OF THE EPA RATING SYSTEM
FOR DRAFT ENVIRONMENTAL IMPACT STATEMENTS:
DEFINITIONS AND FOLLOW-UP ACTION *

Environmental Impact of the Action

LO--Lack of Objections

The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplish with no more than minor changes to the proposal.

EC--Environmental Concerns

The EPA review has identified environmental impacts that should be avoid in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO--Environmental Objections

The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU--Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1--Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2--Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoid in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3--Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussion are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

*From EPA Manual 1640 policy and Procedures for the Review of Federal Actions Impacting the Environment.

CITY/BOROUGH OF JUNEAU
ALASKA'S CAPITAL CITY

April 7, 1997

RECEIVED

Juneau Ranger District

Mr. Roger Birk
EIS Team Leader
U.S. Forest Service
Juneau Ranger District
8465 Old Dairy Road
Juneau, Alaska 99801

Subject: **Kensington Gold Project**
Draft Supplemental Environmental Impact Statement

Dear Mr. Birk:

The City and Borough of Juneau (CBJ) has reviewed the *Kensington Gold Project Draft Supplemental Environmental Impact Statement* (Draft SEIS) and appreciates this opportunity to provide comments to the U.S. Forest Service. As you are aware, CBJ treats the Draft SEIS as part of the application submitted by Coeur Alaska, Inc. for a Large Mine Permit, in accordance with the CBJ Mining Ordinance (CBJ 49.65.130). CBJ uses the Draft SEIS as one source of information as it conducts the Large Mine Permit review, and the CBJ Mining Ordinance requires that the CBJ Community Development Department consider the Final SEIS before submitting final recommendations to the Planning Commission for their formal action on the Kensington Large Mine Permit.

The CBJ comments focus on the accuracy of information in the Draft SEIS and need for some additional information in the Final SEIS which will further public decision-making. Our comments reflect general concerns of the CBJ, rather than any formal position by the Planning Commission. The comments are presented by topic with page references in the Draft SEIS wherever possible.

Current Mining Plan and the Potential for Acid Rock Drainage

The Draft SEIS (page 2-6) directs the reader to the 1992 FEIS for a description of the mining plan for the Kensington Gold Project. Changes in the mining plan have occurred since the 1992 FEIS, most importantly the proposed backfilling. The Final SEIS should include a description of the paste backfilling proposal and show how the tailings backfilling system is supposed to work and generally where permanent pillars will be left to prevent subsidence. The current mining method is described in Coeur's *Amended Plan of Operations* (1996) and backfilling is described 43-1

155 South Seward Street, Juneau, Alaska 99801

RESPONSES TO COMMENTS
Commentor No. 43: City and Borough of Juneau, Cheryl Easterwood

Response to Comment 43-1

A presentation of specific details of the paste backfill system proposed under Alternatives B through D is not necessary to conduct the SEIS analysis. Also, please see the response to Comment 5-5.

in Coeur's *Application for a Solid Waste Management Permit* (1996) and more recent company information. 43-1 (cont.)

The presentation of information on the acid-generating potential of the ore on page 3-2 and in Appendix D of the Draft SEIS needs to be clarified in the Final SEIS. The discussion would be more complete if the Final SEIS included the most recent chronology leading up to the release of the draft NPDES by the EPA. It is our understanding, that earlier (1994) EPA concerns about the representativeness of the ore samples have been resolved; the Final SEIS should clearly state this conclusion. 43-2

The discussion of acid-base accounting testing on page 3-2 of Draft SEIS references a data source which EPA questioned because of data averaging errors in their June 15, 1995 response to the Kensington Venture's comments on the 1994 *Technical Assistance Report*. As indicated in the attached section of the 1995 EPA letter, the problem arises from averaging the ratios of acid neutralizing to acid generating potential in samples of the ore body. Calculating the ARD risk of the orebody in this way exaggerates the acid *neutralizing* character of the orebody. At the time EPA concluded that recalculating the data yielded a higher acid-*generating* risk that warranted additional and more sophisticated testing of the rock. Again, the extent to which more recent draft NPDES permitting information resolves this data and ARD risk issue should be clarified in the Final EIS. 43-3

Also, the presentation of the acid-base accounting test results on page 3-2 and in Appendix D should be clarified to explain the difference between *length-weighted* drill core intercepts, which are reported as mostly net acid-neutralizing (page 3-2), and the *individual* drill core samples which indicate considerable variability and need for more test work (page D-2). As currently presented, the information appears somewhat contradictory and doesn't lead to the single conclusion of low potential for acid generation offered in the Draft SEIS. 43-4

Landslides and Avalanches

Figure 3-1 of the Draft SEIS (page 3-4) shows the general pattern of avalanche paths impinging on the project site, but fails to show the spacial relation between avalanches and planned mining facilities. The Final SEIS should provide this, and it will show the Ophir Path reaching and crossing the proposed Ophir Creek diversion channel. Blockage of the diversion could be caused by avalanches or by debris flows or other heavy sediment transport events coming down Ophir Creek. A general discussion of mitigating measures, such as response equipment to clear a blockage, appears warranted. 43-5

Also, a 0.6 mile long diversion ditch is proposed behind the mine surface facilities and may be vulnerable to blockage by sediment carried in stormwater flows down the side of Horrible Hill. 43-6

Response to Comment 43-2

Section 3.3 of the Final SEIS has been modified to briefly describe the chronology of geochemical testing. Appendix E of the Final SEIS summarizes all of the ore characterization work, including studies completed to address representativeness.

Response to Comment 43-3

Ratios of neutralizing potential to maximum potential acidity (NP/MPA) have been recalculated, as shown in Tables E-1 and E-2 of the Final SEIS. Section 3.3 of the Final SEIS has been revised accordingly.

Response to Comment 43-4

The discussion of acid-base accounting results of individual drill core samples of ore and length-weighted drill core intercepts has been revised to remove inconsistencies between Section 3.3 and Appendix D of the Draft SEIS (Appendix E of the Final SEIS). While these results provide higher acid generation potential for ore samples, the conclusion given in Section 3.3 of the Draft SEIS that the potential for acid rock drainage (ARD) is low has not been modified. Offsite processing under the selected alternative in the Forest Service Record of Decision would ensure no ARD potential in the tailings. Waste rock exhibits very low acid generation potential. Nearly 10 years of data on the existing mine drainage have shown no indication of acid generation. In addition, kinetic humidity cell testing of an ore composite conducted in 1996 showed neutral pH and low metal concentrations throughout the 20-week test. EPA has concluded that the existing mine drainage data and comprehensive length of ore body and waste rock testing program are representative of likely conditions during full-scale mining operations. EPA would use ongoing mine drainage monitoring to detect any unexpected indicators of acid generation throughout the life of the mine.

Response to Comment 43-5

Figure 3-1 has been revised in the Final SEIS, and Figures 4-2 and 4-3 have been added to Section 4.2 (analysis of geotechnical environmental consequences) of the Final SEIS. Section 4.2 of the Final SEIS has been modified to include mitigation in case an avalanche or debris flow blocked diversions.

Response to Comment 43-6

Please see the response to Comment 43-5.

The Final SEIS should discuss this diversion ditch, the potential for blockage and flooding of mine site facilities, and mitigating measures. 43-6 (cont.)

Hydrology

Sherman Creek Drainage Basin. In the description of watershed characteristics of Sherman Creek on page 3-7, the Draft SEIS references a 1989 hydrology report prepared by the Kensington Venture. It is our understanding that the information provided comes instead from a 1994 Knight Piesold Ltd. *Final Report on Hydrology*. The information in the Draft SEIS (page 3-7) regarding the acreage, elevations, and descriptions of sub-basins in Upper Sherman Creek needs to be clarified. It is unclear whether the south fork of Sherman Creek is included in the acreage figures, or which sub-basins are being considered when determining the highest elevation. Also, we estimate that closer to 50 percent of the basin is above timberline, rather than the 20 percent reported. 43-7

Sherman Creek Water Flows. Table 3-4 (page 3-13) presents estimates of mean monthly flows for Sherman Creek, which are calculated as averages of seven regional stations and historic Sherman Creek data. These estimates appear to be too high in winter and too low in summer and yield a mean annual flow that is substantially lower than that gauged by the USGS and estimated by the USFS. The ratio of the highest monthly flow to the lowest in Table 3-4 is only slightly over one-third the ratio commonly found in gauged streams in this area. Also, the mean annual flow of 24.8 cfs compares poorly with the 30.8 cfs gauged in the upper Sherman Creek drainage basin by the USGS and the 43 cfs estimated for the entire basin by the USFS and reported in Table 3-3 of the 1992 FEIS. 43-8

The planned withdrawal of 0.52 cfs of potable water from Sherman Creek for the mine, mill and camp is described on page 4-20 of the Draft SEIS as representing seven percent of the lowest mean monthly flow. If the monthly flows are recalculated to conform more closely with the regional pattern, this percentage would be two or three times greater. The USFS should revisit the mean monthly flow data to clarify the estimates to be presented in the Final SEIS. Also, the monthly in-stream flow requirements established for Sherman Creek by the Alaska Department of Fish & Game to protect aquatic life should be spelled out in the Final SEIS, preferably as a percentage of available water flow rather than as a fixed flow quantity. 43-9

Dry Tailings Facility

The proposed DTF under Alternatives B and D raises some issues and questions that are not adequately addressed in the Draft SEIS. While we recognize the much of the DTF detail will be addressed in the Alaska Department of Environmental Conservation Solid Waste permit, the CBJ would like to see a general discussion of the following topics in the Final SEIS: 43-10

Response to Comment 43-7

Section 3.5.2 of the Final SEIS has been modified to include a general description of South Fork Sherman Creek. The acreages presented in Section 3.5 of the Draft SEIS are accurate.

Response to Comment 43-8

Data from the regional hydrologic analysis, described in the *Final Report on Hydrology* (Knight Piesold, 1994), were used to provide baseline characterization data in the Draft SEIS. This report is included in the SEIS Planning Record. When conservatively applied, regional analyses can provide better estimates of characteristic stream flows than estimates obtained using a short-term data base, such as the one available for Sherman Creek. The FLOOD model used in this study provides a range of outputs for characteristic flows based on different degrees of statistical confidence. The *Final Report on Hydrology* presents a range in characteristic flows by statistical confidence level. Also, please see the response to Comment 18-7.

Response to Comment 43-9

Please see the responses to Comments 18-7 and 43-8. Section 3.5 of the Final SEIS has been modified to include mean monthly flows based on stream gauge data from station 105, as well as projected flows from the regional study cited by the commentor. Section 4.3 of the Final SEIS includes instream flow requirements for Sherman Creek and discusses water availability.

Response to Comment 43-10

The operator prepared detailed construction quality control/quality assurance plans and a detailed monitoring plan, which are summarized in the *Technical Resource Document for Geotechnical Considerations* (Klohn-Crippen, 1997). This document is included in the SEIS Planning Record. Section 4.2 of the Final SEIS indicates that the potential for saturation under Alternatives B and D is the same. If the DTF became saturated, the berm would provide sufficient stability for a worst-case failure scenario while the operator implemented measures to eliminate saturation and/or increase structural stability, as appropriate.

- *Constructing and Maintaining an Unsaturated DTF.* A general explanation is needed of the design features, quality control measures, and daily construction practices that Coeur is proposing which are geared toward building and maintaining an unsaturated DTF. Implicit in Alternative D is the assumption that the DTF will become saturated, whereas Alternative B assumes an unsaturated facility with monitoring for contingencies. — 43-10 (cont.)

- *Engineered Berm Construction.* A general discussion of the buttress-style construction model proposed for the engineered berm (Alternative D; Figure 2-10) is warranted. The Final SEIS should also clarify if this same model is proposed as a contingency berm under Alternative B. The berm characteristics that aid stability and containment of the dry tailings should be explained. A brief comparison with other berm construction models would help dispel confusion about which is most suitable for the Kensington DTF alternatives. For example, the size of the footprint of different berms -- as it relates to environmental impacts -- should be described. — 43-11

  Finally, paragraph 4.2.6 (page 4-16) refers to Figure 2-4 for the layout of the contingency-style berm, but the significantly enlarged footprint that would be required to build it is not shown in Figure 2-4. Also, the text mistakenly refers to Figure 2-11 rather than Figure 2-10 for the berm cross-section. — 43-12

- *East (Uphill) Side of the DTF.* An explanation is needed for the lack of a berm along the east (uphill) side of the DTF under either Alternatives B or D, or why the DTF is not constructed so that uphill slope acts as a natural berm. The Draft SEIS does not make a case for completely discounting the possibility of failure on the east side of the DTF so as to negate the need for a berm. What are the potential environmental impacts of failure along the uphill side of the DTF? As you are aware, the Klohn-Crippen report *Kensington Tailings Facility - Geotechnical Resource Report* (1997) presents an alternative design option that places the DTF against the hill to the east. What are the reasons that the Draft SEIS did not consider this design option? — 43-13

- *Source Material for Engineered Berm.* No source of materials to build the contingency berm in Alternative B is identified in the Draft SEIS. Rough calculations indicate an additional volume of rock, till or gravel equaling the output of all presently designed up-valley borrow pits would be needed to construct such a berm, particularly if protection were to be provided for the entire DTF perimeter. What are the pros and cons of different materials (and sources) for berm construction (i.e., compacted tailings, waste rock, new borrow sites, etc)? The Final SEIS needs to identify such berm material sources, related environmental impacts, and mitigation measures. — 43-14

Response to Comment 43-11

The berm has been designed to meet generally accepted engineering safety factors for stability. These factors control the berm footprint and size. The berm included under Alternative D is based on the assumption that the lower lift could become saturated on the west, north, and south sides of the DTF. Under Alternatives B through D, if monitoring indicated that saturation extended to the upper lifts or to the east side, then the size of the berm would likely have to be increased. The exact footprint of a larger berm would depend on the location and extent of the operator, the designers, and regulators to assess the performance of the first cell construction and operation and to allow time to increase the berm height or to extend the width, if required.

Response to Comment 43-12

The construction of a structural berm on the west side of the DTF is a contingency to prevent potential effects on Lynn Canal that could occur from a slope failure under extreme conditions. A failure could occur only under extreme seismic loading if saturated conditions existed. A slope failure on the east side of the DTF would not extend out the same linear distance as the west side because the failure would be uphill. The same level of contingency is not required on the east side of the DTF because the potential impacts that could result from a slope failure are small. The reference to Figure 2-11 in the Final SEIS has been corrected to indicate that Figure 2-10 presents the berm cross section.

Response to Comment 43-13

Please see the response to Comment 43-12. A berm would be required on the uphill side if the tailings in that area were shown to become saturated. The likelihood of this area becoming saturated, however, is less than the likelihood of the downhill (west) side. The results of a failure on the east side would be an infill of the diversion channel and ongoing deterioration of the DTF.

Response to Comment 43-14

The berm could be constructed out of mine rock, tailings, or other competent soil/rockfill material. The volume of tailings available would be unlimited. Compacting tailings could be difficult during high precipitation periods, however. This could necessitate preferentially compacting tailings during dry periods. The use of tailings would require placement of erosion protection materials, such as glacial till, on the outer slopes.

- *Monitoring for Saturation of the DTF.* A weakness of the Draft SEIS is little discussion of the DTF monitoring proposed under Alternative B. In order to fully consider the dry tailings disposal, it is essential that the Final SEIS provide a general discussion of the extent and adequacy of the proposed monitoring in Alternative B, which is intended to provide the necessary field data to determine whether, and to what extent, saturation might be occurring in the DTF. The Draft SEIS lacks any discussion of DTF monitoring in Section 2.5.2 Monitoring (page 2-33) and barely touches on the subject on page 2-23 and page 4-16.

  The Final SEIS should address the following questions: What would be monitored? What is the accuracy and reliability of the monitoring equipment? What are the different scenarios of size and location (top vs. bottom lift, single- vs. multi-lift, center vs. edge of DTF) of saturated areas in the DTF and the probable extent of failure given a sufficient seismic event? How much time is available to construct a berm if saturation is detected? What is the effect of a localized failure on the remaining DTF and what corrective actions are needed? What is the need for and extent of long-term, post-closure DTF monitoring? 43-15

  A critical issue is determining the amount, type, rate, and duration of saturation that would trigger a decision to construct a contingency berm. The Draft SEIS (page 2-23) states that 'if monitoring data indicated that ***widespread saturation*** were occurring, Alternatives B and C would include a contingency to construct an engineered structural berm..." The Final SEIS needs to better define "widespread saturation". Finally, information about the success or failure of monitoring efforts for tailings facilities at other mines should be presented. 43-16

- *Cost of a Contingency Berm.* While not required in a NEPA document, it would be useful to have an estimate of the cost to construct an engineered berm sufficient to contain the proposed DTF in the Final SEIS. The contingency (Alternative B) and engineered (Alternative D) berm options could be considered as well as the availability of source materials during mine operations or after mine operations cease. 43-17

The CBJ suggestions for improvements to the entire DTF discussion in the Final SEIS would enable the readers and local decision-makers to draw their own, more informed conclusion about the merits, risks, and contingencies of Alternatives B and D with respect to the DTF. We are not seeking detailed design work on the berm alternatives, rather a general discussion of the issues and access to reasonably available data relevant to the local permitting process.

Response to Comment 43-15

The operator developed a detailed monitoring plan, which is included in the SEIS Planning Record. The focus of the plan is to locate zones of saturation that could be large enough to influence DTF stability. The monitoring includes piezometer installation on a grid network. More important, however, would be the use of cone technology to more definitively assess the saturation state throughout the pile. Electronic cones would be pushed into the tailings and could provide a continuous readout on density and degree of saturation. Such programs would be carried out on a regular basis to show that the piezometers were providing representative measurements and that the DTF was performing as designed. Widespread saturation could be considered to occur when the width and depth of the saturated zone from the outer slope were equal to the height of the slope above the saturated zone.

Response to Comment 43-16

See the response to Comment 43-15 for further definition of widespread saturation. However, there is no predetermined level of saturation that would automatically trigger berm construction. The Forest Service would make such a determination based on the specific circumstances. The monitoring program is designed to detect any changes in water levels occurring throughout the unit, however. Therefore, the requirement to construct a berm probably would occur prior to the observation of widespread saturation. Sections 2.3.6 and 4.2 of the Final SEIS have been modified to indicate that the berm would be constructed when monitoring showed the unit was not performing as designed and widespread saturation could occur.

The monitoring approaches described in the response to Comment 42-16 are proven techniques that have been used to measure water levels and dam stability worldwide. As noted in the Final SEIS, however, no other DTF units of comparable size and design and in similar climates as Alternatives B through D exist. The Forest Service Record of Decision provides the rationale for the selected alternative.

Response to Comment 43-17

A cost estimate for an engineered berm is beyond the scope of this SEIS analysis.

Tailings Slurry Pipeline

The CBJ urges the U.S. Forest Service to revisit the slurry-pipeline mode of delivering tailings to the DTF. We question its inclusion in preferred Alternative D. The reason is that the probable spill volume (size divided by the recurrence interval) of a slurry spill is four times as great as the result of a truck spill, as noted on pages 4-86 and 4-88 in the Draft SEIS. A pipeline spill would also be considerably harder to clean up The one potential advantage of pipeline transport is reducing dust generated by truck traffic, but a comparison of the dust generation under both scenarios indicates that both fall below State air quality standards. 43-18

Monitoring

Table 2-2 (page 2-34) summarizes monitoring activities likely for the Kensington Gold Project. The table in the Final SEIS needs to include the CBJ role in monitoring. The CBJ Mining Ordinance (CBJ 49.65.150) authorizes monitoring of a mining operation, with the operator paying an annual fee (established by the Planning Commission) to cover reasonable costs to inspect and review compliance with the CBJ large mine permit. In this vein, the Final SEIS text about monitoring on page ix should read: "...the operator would coordinate with Federal [and], State, and local agencies in implementing a broad monitoring program..." 43-19

In addition to other agencies' monitoring requirements, the CBJ Mining Ordinance (CBJ 49.65.135(b)) specifies requirements for a mining reclamation plan and calls for monitoring the operator's compliance with the reclamation plan. Table 2-2 should include CBJ and the Mining Ordinance in the row specifying monitoring of reclamation specifications. 43-20

The need for more information on monitoring of the DTF in the Final SEIS was previously discussed under the Dry Tailings Facility comments. 43-21

Reclamation

The Draft SEIS describes reclamation in fairly general terms and refers the reader to the applicant's reclamation plan in Appendix B. Of note in the reclamation plan is the closure criteria (page 4-9; Appendix B). CBJ believes that 30 percent live vegetated cover after three years is not adequate to meet reclamation objectives such as restoration to pre-mine wildlife habitat capability. Under the authority in the local Monitoring Ordinance, CBJ will be working with Coeur in the coming weeks to identify adequate performance criteria for a revegetation strategy in the company's reclamation plan. CBJ intends to also work with the U.S. Forest Service to meld our reclamation requirements into a common approach. The reclamation plan will be reviewed for approval under the CBJ large mine permit (49.65.135(b)). 43-22

Response to Comment 43-18

See the responses to Comments 32-21 and 32-31. The tailings slurry pipeline would be double-walled and equipped with leak detection sensors to minimize the potential impacts from a failure.

Response to Comment 43-19

Since CBJ permit has not been developed, the Final SEIS does not include CBJ's specific monitoring role. The Forest Service acknowledges that CBJ's permit probably would include similar monitoring of many of the resources included in Table 2-3 in the Final SEIS. The Summary of the Final SEIS has been modified to reflect the commentor's suggested text change.

Response to Comment 43-20

Table 2-3 in the Final SEIS (Table 2-2 in Draft SEIS) has been modified.

Response to Comment 43-21

Please see the response to Comment 43-16.

Response to Comment 43-22

Section 2.5 of the Final SEIS has been modified to include revised reclamation criteria.

Socioeconomic Resources

Page 4-80 of the Draft SEIS anticipates that the City and Borough of Juneau will experience modest fiscal deficits, although it suggests that the deficits would be lower than under the earlier Kensington mine project. To the contrary, the detailed fiscal analysis performed by the CBJ, *Draft Socioeconomic Impact Assessment* (February 1997), shows that CBJ will experience a net fiscal surplus over the life of the Kensington mine project. The mine-related revenues to CBJ are projected to more than offset the incremental expenditures due to a modest population increase and the reduction in State education support (due to the anomaly in the Foundation funding). We request that the Final SEIS present the positive fiscal impacts projected for the Kensington mine, as portrayed in this recent assessment, which will be finalized in the next few weeks. 43-23

Alternative A

Throughout the Draft SEIS, CBJ sees scant attention given to the serious deficiencies previously identified with respect to what is now called Alternative A (No Action). Several problems were identified by CBJ during the 1992 NEPA review and were also presented by the Environmental Protection Agency (EPA) in the *Technical Assistance Report* (1994). Among the problems with Alternative A that should be brought out in the Final SEIS are the vulnerability of planned stream diversions to blockage, loss of downstream spawning gravel deposits, and problematic reclamation. Presenting a more complete and accurate account of Alternative A is worth doing for the record, even though currently there is no interest in pursuing this plan.. 43-24

Public Comments and Testimony on the Draft SEIS

The CBJ requests a copy of all public comments the USFS receives on the Draft SEIS, as well as any summary or transcript prepared for the March 25 and 26, 1997 public hearings. Under the CBJ Mining Ordinance, these comments and testimony are considered along with the Draft and Final SEIS as part of the application for a Large Mine Permit. We request that this information be provided to CBJ at your earliest convenience so that staff can consider it as CBJ continues the local review of the Kensington Gold Project. 43-25

Again, the City and Borough of Juneau appreciates this opportunity to provide comments to the USFS on the Kensington Draft SEIS. The agency efforts in identifying many of the impacts of the proposed mine project are apparent. CBJ focused our comments on the relatively few, albeit important, issues that we believe need to be addressed as you prepare the Final SEIS. Please contact Gretchen Keiser (586-5230) if we can answer any questions regarding our comments.

Response to Comment 43-23

As reported in the Draft Socioeconomic Impact Assessment, City/Borough of Juneau, February 1997 (CBJ, 1997), the Kensington Gold Project would generate an overall cumulative surplus of $5.8 million when considered over the 17-year period of construction, operations, and reclamation. The overall net present value of the fiscal balances produced by the project would amount to a surplus of $3.9 million, based on a 3-percent real discount rate. If computed over the first 5 years, however, the net present value of the fiscal balances would amount to a deficit of $160 thousand. Section 4.11 of the Final SEIS presents the results of the fiscal analysis provided in the CBJ study.

Response to Comment 43-24

The Forest Service acknowledges the issues raised by CBJ related to Alternative A. Section 2 of the Final SEIS compares the potential impacts of each alternative, and the Forest Service Record of Decision provides the rationale for the selected alternative. The Final SEIS references the analysis of Alternative A in the 1992 FEIS.

Response to Comment 43-25

Copies of the comment letters and transcripts were supplied to CBJ.

Sincerely,

GKeiser for

Cheryl Easterwood, Director
Community Development Department

Attachment

cc: Rick Richins, Coeur Alaska, Inc.
CBJ Planning Commission members
Bruce Baker, Kensington Coalition
Barbara Berg, CBJ Librarian (2 copies)
Rex Blazer, DGC*
Aaron Brakel, Juneau
Bruce Brunette, USFS
Ben Cope, EPA
John Corso, CBJ Attorney
David Crosby, Wickwire et.al.
Dan Easten, Easten Environmental*
Tim June, Haines
Ben Kirkpatrick, DFG*
Howard Lockwood, Juneau
Berne Miller, SE Conference
Marian Miller, CBJ Clerk
Dean Paddock, Juneau
Andy Pekovich, DNR*
Ben Pollard, CBJ Engineering
Patty Ann Polley, Juneau Chamber of Commerce
Ron Rimelman, SAIC
Bob Robinson, Juneau
Sharman Stambaugh, DEC*
Randy Wanamaker, Gateway Technologies (fax: (907) 789-6856)
Jim Wilson, Coastal Helicopters

* Distributed by email.

Attachment To CBJ Comments on Draft SEIS

Review of Information Submitted by the Kensington Joint Venture in Response to EPA's Technical Assistance Report on the Kensington Mine Project

Introduction

On November 8, 1994, The Environmental Protection Agency's Region 10 office issued a Technical Assistance Report (TAR) for the Alaska District Corps of Engineers that addressed short and long-term water quality and ecological impacts of the proposed Kensington Mine project. The report addressed three fundamental questions:

- Is there reasonable assurance that discharges from the tailings impoundment would meet applicable effluent limits and state water quality standards (WQS)?
- Is there reasonable assurance that the long-term risk of contamination of surface and ground water is acceptable?
- Is there reasonable assurance that the ecological integrity of aquatic resources affected by the project would be restored?

With respect to the first two questions, the TAR concluded that information available at the time the report was prepared indicated that there was not such reasonable assurance. With respect to the third question, the report concluded that, provided the risk of long-term contamination is ultimately proven to be acceptable, reclamation could be implemented to restore forested wetlands that currently dominate the project area.

The TAR presented six specific findings that bear on these questions and that represent deficiencies in either the project design or data and analyses supporting the project design. Along with the deficiencies identified in each finding, EPA presented a recommendation for addressing these deficiencies. The Kensington Joint Venture (KJV) has since submitted a considerable amount of new information, including some redesign of the project, in response to these recommendations. What follows is EPA's evaluation of that information and recommended permit conditions to assure compliance with the CWA 404 (b)(1) Guidelines.

Finding #1: ~~The KJV has not demonstrated that the tailings pond alone would provide adequate treatment of mine effluent.~~

~~Recommendation: The KJV should provide additional wastewater treatment to meet total suspended solids, arsenic and cyanide effluent limits, or~~

B. Discussion of the Adequacy of the Information Submitted

KJV has satisfied the recommendation in the TAR by supplying additional information and relocating the proposed outfall to deeper water. EPA notes that additional work to refine the dilution analyses may be required as support for the 401 certification of the NPDES permit.

C. Recommendation

No CWA 404 permit conditions are necessary.

Finding #5: The potential for long-term contamination of surface and ground water cannot be determined on the basis of existing data and analyses.

Recommendation: New leach tests for metals mobility and kinetic testing for potential acid generation are required. Further analysis of residual cyanide and its breakdown products is also needed.

A. Information submitted by KJV in response to the TAR recommendations:

The KJV submitted a number of documents which are applicable to this finding:

A report, Analysis of Acid-Base Accounting Data, Kensington Mine Project prepared by Geochemica, Inc. and Kensington Venture, November 1994.

A memorandum from Gene Andrews to Bill Riley, January 2, 1995, transmitting a Pilot Scope Outline.

The same treatability reports referenced under Finding #1 including Water Treatability: Kensington Mine Project by Gene Andrews, Terry I. Mudder, and David McWharter, Environmental Associates, April 2, 1995, and An Investigation of the Recovery of Gold from Kensington Project Samples Submitted by Echo Bay Mines, Progress Report No. 1, Project L.R. 4688, by Lakefield Research, March 9, 1995.

A letter from Robert T. Richins, Coeur d'Alene Mines to Janis Hastings, May 23, 1994, concerning copper and acid generation potential.

A facsimile from Frank Bergstrom, Echo Bay, to Bill Riley, May 24, 1995, transmitting a memorandum from Rene Jackman, Lakefield Research, to Frank Bergstrom,

May 16, 1995, on preliminary data for tumbler tests and humidity cell tests.

The Geochemica (1994) report provides a detailed characterization of the district geology and hydrothermal alteration aspects of the Kensington mineralized area that affect the potential for acid generation. The report also includes an extensive geochemical data base of acid-base accounting analyses of core samples of ore and development rock from across the site. The nature of the samples with respect to gold content, sulfur, sulfide, acid generation potential (AGP), acid neutralization potential (ANP), and paste pH is provided by this report, as well as detailed cross section information of the source of the samples. The acid-base accounting data complements additional multi-element data from the same core samples listed in a geochemical characterization report by the Kensington Venture (1994) noted below for Item #6.

The pilot scope outline, treatability reports, and subsequent related correspondence noted above provide information on planning, progress, and preliminary data for leachability, acid-base accounting and kinetic tests of tailings samples.

B. Discussion of the Adequacy of the Information Submitted

Two aspects of long-term contamination are at issue in Finding #5: a) the leachability of metals, residual cyanide, and cyanide breakdown products; and b) the potential for generation of acid drainage and additional metals mobility.

The rationale for the leach tests recommended for the first part of Finding #5 was to provide evidence of potential leachability under conditions that tailings would experience in the environment. Considering present information, tailings at Kensington could conceivably experience different pH conditions depending on whether the tailings reside in alkaline environment because of the alkaline chlorination used for cyanide destruction, an acidic environment because of other treatability residuals from processes such as ferric chloride precipitation or acid volatilization, or a near-neutral environment because of extensive flushing or erosion by surface water. To cover the range of potential environments, leach tests were recommended at different pH values.

The January 1995 Pilot Scope Outline indicated that leach tests would be conducted at pH 4, 7, and 9, although a detailed protocol was not specified. The March 1995 Lakefield Research report stated (page 23) that tumbler

tests were underway at various pH's, although again no protocol was provided. Recently preliminary leach test results (facsimile noted above) were provided for neutral to mildly acidic pH values of 5, 6, and 7. Although the leach test results do not indicate a high degree of leachability, no protocol nor description of materials used for these tests have yet been provided. Following are examples of basic questions that lack information at this time:

1. What are the source, physical, chemical, and mineralogical characteristics of the samples used for the tests? What data demonstrate that the samples are representative of projected wastes?

2. What are the results for leachable cyanide and cyanide breakdown products, which were parameters not included in the preliminary results?

3. What methodology is used for tests; method of pH buffering; tumbling; time; proportions of materials; containers; temperature, reagents, etc?

4. What are the results of the pH 4, 7, and 9 tests referenced in earlier 1995 documents?

Acid-base accounting screening-type tests described in the Geochemica (1994) report partly address the aspect of Finding #5 that considers the potential for acid generation. The report uses a method of data evaluation that relies on the ratio of acid neutralization potential to acid generation potential (ANP/AGP) as a guide in evaluating the net potential. By the approach used in the report, a ratio of less than 1 for a sample indicates a high probability that the material could oxidize and generate acid drainage. A ratio of greater than 3 indicates a high probability that the material will not generate acid. A ratio between 1 and 3 is an uncertain range that may or may not be acid generating depending on the kinetics of the two reactions for the particular material tested. In these cases, kinetic tests may be recommended. Based on sparse data available for the TAR, Finding #5 recommended kinetic tests.

The Geochemica report showed that 96 samples of representative development rock had ANP/AGP ratios greater than 3 and were unlikely to generate acid. EPA agrees with this conclusion for development rock.

The Geochemica report provided data for almost 600 samples of ore and concluded that ore also was unlikely to generate acid and that no kinetic testing was needed. The Geochemica evaluation was based in part on grouping contiguous core data and averaging the results across the

length of 39 intercepts of the ore body. Using this approach, Geochemica (1994) concluded that only one of the 39 intercepts had an ANP/AGP less than 3, and the average of all intercepts was quite high at 17.09 supporting a conclusion of no potential for acid generation.

EPA agrees with the approach of using core intercepts as one means of estimating representative averages of ore parameters. However, the method of averaging used in the Geochemica report appears to overestimate the ANP/AGP. The question arises initially from two fronts. First, inspection of the Geochemica data shows that some 30% of the individual core samples had an ANP/AGP ratio less than 3, low enough to indicate a need for kinetic testing. Second, the Lakefield Research report of treatability work found an ANP/AGP of 1.6 for combined tailings produced from representative ore, and cited the need for kinetic testing to classify the net potential for acid generation.

The source of the discrepancy appears to lie in the method used in the Geochemica report for averaging intersect data. The Geochemica method appears to first calculate individual ANP/AGP ratios for each of the individual core samples, and then average these ratios for each set of core samples that cross the 39 intersects. The method is flawed in that it does not treat averages of ratios correctly nor does it appear to represent the data. A more appropriate method would be to first calculate average values of ANP and AGP separately for each core intersect, and then ratio the average values. The difference between the two methods is the order of ratioing and averaging. The EPA method is to average first, then ratio; the Geochemica method appears to be to ratio first, then average.

The difference in representativeness of the two methods is clearly shown by graphs similar to Figures 2 and 3 in the treatability report. The graphs in this report appear to depict average data calculated by the same method as used for data tabulated in the Geochemica report. Figures 1 and 2, which follow here, are similar to Figures 2 and 3, respectively, in the treatability report. In addition to plotting average values for intersects, Figures 1 and 2 here also include the data for individual core samples to show the overall spread of data from which the averages are derived.

Figure 1 shows the ANP/AGP variation with respect to sulfur concentration. With increasing sulfur content ANP/AGP drops indicating an increasing potential to generate acid. Averages from tabulated data in Geochemica (1994) and similar to data shown in the treatability report (Fig. 2) is shown here as "B" in Figure 1, where dots represent

individual core samples, and squares represent the averages. As can be seen in B, the average values for ANP/AGP are distinctly elevated in comparison to the general spread of the individual core data. This relationship suggests that the Geochemica (1994) method of averaging core data overestimates ANP/AGP, and hence underestimates the potential for acid generation.

The EPA calculation of averages is shown as "A" in Figure 1. As can be seen in A, all of the average values calculated for the intersects fall within the spread of the individual core data. Furthermore, the mean of the intersect averages of ANP/AGP is 3.6 by the EPA method, compared to 17.09 reported by Geochemica (1994).

A second example on a log/log graph to show detail in the "uncertain" range of 1 to 3 for ANP/AGP is provided by Figure 2 for the variation of ANP/AGP with respect to gold concentration. This Figure is similar to Figure 3 of the treatability report. The significance of the difference in averaging is readily apparent, whereby the Geochemica method clearly underestimates the number of intersect averages that fall below an ANP/AGP of 3. The EPA method indicates some 35% of the average values lie below an ANP/AGP of 3, consistent with the large number of individual core samples that also have values less than 3. These results verify the earlier conclusion that kinetic information should be considered in assessing the acid generation potential.

EPA does not necessarily believe at this time that these results show that net acid generation is likely from these materials. Rather the conclusion is that the accounting data show that kinetic tests are appropriate and necessary to provide verification that acid drainage is unlikely.

As with the leach test information, some preliminary kinetic test data were provided by facsimile (noted above) with no documentation of methods and materials. The same basic data requirements listed above for leach tests are also needed for kinetic tests.

C. Recommendation

EPA recommends the following permit conditions to address these concerns:

Roger Birk, EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, AK 99801

Dear Sir:

I am writing concerning the Supplemental Draft Environmental Impact Statement (SDEIS) for the Kensington Mine. Please incorporate my comments into the planning process.

- *Cumulative Impacts:* it is extremely important that the SDEIS look at all reasonably foreseeable impacts in the region of the mine. The Berners Bay watershed in particular will experience significant impacts from the Proposed Juneau Access Road, Julian Mine, proposed Lace River Hydro Project, and Goldbelt Native Corporation development. 44-1
- *Tailings:* I would like to see all of the tailings returned to the mine with less than 50% of the production accumulated on the surface at any one time. Therefor, tailings must be returned to the mine from the onset of production. 44-2
- *Berm:* The tailings impoundment should include a protective structural berm around the tailings and pipeline to ensure that the tailings do not spill into Lynn Canal or over the adjacent land. 44-3
- *Underground Pipes:* The Forest Service plan and Corps of Engineers permit should contain rationale for long underground pipes into upper Sherman creek and Ivanhoe Creek as well as a open ditch for diversion of Ophir Creak around the mine site. 44-4
- *Monitoring:* The DSEIS should describe and evaluate monitoring requirements for the Plan of Operations. This will ensure that the public is able to monitor and evaluate the severity of adverse effects from the project. 44-5
- *Commercial Fishing:* The SDEIS needs to disclose and evaluate effects of discharged mine drainage water on migrating salmon and other marine life. In addition, potential economic impacts should be described, including the potential for losses from real or perceived contamination of seafood products in Lynn Canal. 44-6

Thank You,

J. Rehfeldt

Jim Rehfeldt
25200 Amalga Harbor Road
Juneau, Alaska 99801

Page 1

RESPONSES TO COMMENTS
Commentor No. 44: Jim Rehfeldt

Response to Comment 44-1

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Response to Comment 44-2

Please see the response to Comment 5-5.

Response to Comment 44-3

Please see the response to Comment 5-1.

Response to Comment 44-4

Please see the response to Comment 5-2.

Response to Comment 44-5

Please see the response to Comment 5-3.

Response to Comment 44-6

Please see the response to Comment 26-15.

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April 7, 1997

Roger Birk, EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, Alaska 99801

Subject: Kensington Mine DSEIS

Dear Mr Birk

This letter is submitted on behalf of the Kensington Coalition and conveys the Coalition's comments on the federal draft supplemental environmental impact statement (DSEIS) for the proposed Kensington Gold Mine. The Kensington Coalition is an affiliation of seven conservation or Native organizations in Juneau and Haines. These organizations are Alaskans for Juneau, Juneau Audubon Society; Haines Alaska Native Brotherhood & Sisterhood, Camp 5, Lynn Canal Conservation Inc ; Sierra Club, Juneau Group, Southeast Alaska Conservation Council, and Taku Conservation Society. The Coalition has not come out in favor of there being a mine but is committed to helping ensure that if a mine is approved, it is designed and developed in such a way as to avoid or minimize potential adverse effects. It should be further noted that individual Coalition member groups may convey positions that differ somewhat from that of the Coalition

The Kensington Coalition *adopts by reference* the enclosed March 31, 1997 report by its consultant, Dr. David M. Chambers, entitled "Comments on Draft Supplemental Environmental Impact Statement including the EPA Draft NPDES Discharge Permit and US Army Corps of Engineers Public Notice for Permit for the Kensington Mine Project." Therefore, both this letter and Dr. Chambers' report comprise the Coalition's comments on the DSEIS, and we request that both of these be addressed by the Forest Service.

We understand that the City and Borough of Juneau's (CBJ) letter to the Forest Service on the DSEIS may include engineering and design questions and concerns regarding the tailings pile and other aspects of the mine We look forward to seeing how the Forest Service responds to any such questions that the borough raises.

Cumulative Impacts

General. The Forest Service needs to describe and evaluate more fully the cumulative impacts from all past, present, and reasonably foreseeable future actions in the rich and productive Berners 45-1

RESPONSES TO COMMENTS
Commentor No. 45: Kensington Coalition, Bruce H. Baker

Response to Comment 45-1

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Bay watershed and immediately surrounding area. Although the Kensington Mine is located just outside the legislated Land Use Designation (LUD) II area in Berners Bay, the mine is the first of several proposed actions that could impact the area's prime fish, wildlife, and recreational values. These actions include the Jualin Mine, the proposed Lace River hydroelectric project, the proposed road to Juneau, Goldbelt Native Corporation's proposal for a new community and ferry terminal in the vicinity of Echo Cove, and helicopter tours requested by Temsco for Berners Bay 45-2

The National Environmental Policy Act (NEPA) requires agencies to consider cumulative actions ". . . which when viewed with other *proposed actions* have cumulatively significant impacts and should therefore be discussed in the same impact statement." (40 CFR Sec. 1508 25(a)(2), emphasis added). An SEIS that addresses the Kensington Mine needs to be comprehensive enough for the reader to understand how the impacts the mine generates fit into the larger context of impacts from it and other proposed projects. One example of the need to look beyond the Kensington Mine is the combined impact of multiple projects on wildlife populations and their habitats. Another example is the visual impact of an overhead power transmission line from the proposed Lace River hydroelectric project across the Point St. Mary peninsula to the Kensington Mine, a topic that we do not see addressed in the DSEIS 45-3

Although there are a number of superficial references in the DSEIS to cumulative impacts, the document fails to describe these impacts in a comprehensive way so that the reader can understand what they are. To state, as is done in the DSEIS, that because plans for some of these projects are not yet permitted or approved and that their cumulative impacts are, therefore, "premature and speculative" is a misrepresentation of the process for addressing cumulative impacts. At the March 25, 1997 DSEIS hearing in Juneau, a Forest Service panelist stated that it is "almost impossible" to evaluate reasonably foreseeable future actions. It is not all that difficult to project cumulative impacts, and we urge the Forest Service, the Corps of Engineers, and the Environmental Protection Agency (EPA) to take a lead from economists who are accustomed to dealing with margins of uncertainty and who do so by stating reasonable assumptions. In the case of the Berners Bay area, the federal agencies need to assume that all of the above mentioned projects will materialize and then evaluate the combined impacts that are expected to result if they do. 45-4

Aquatic Resources. The treatment of cumulative impacts to marine aquatic resource is completely inadequate and needs to be strengthened. We find only the proposed Lace River hydroelectric project mentioned under the Cumulative Effects heading. We cannot find any reference to fish as an aquatic resource. There is an assumption that protecting water quality, preventing sedimentation, and maintaining the integrity of marine habitats would protect fish, but this ignores the impact of increasing numbers of people in the project areas. Clearly, a second mine (the Jualin) adjacent to the Kensington Mine, a housing development and marine terminal at Echo Cove, and a road along Lynn Canal would create a tremendous increase in human access to marine resources and could have a major impact. 45-5

Increased sport and subsistence fishing by new residents at the mine sites, at Echo Cove, and in the Juneau borough in general would undoubtedly be substantial. The Forest Service needs to project what effect this trend would have on people engaged in commercial, sport, and 45-6

Response to Comment 45-2

Please see the responses to Comments 45-1 and 26-8.

Response to Comment 45-3

As documented in Section 4.14 of the Final SEIS, the operator has indicated that it will not purchase power from the Lace River Hydroelectric Project. Therefore, the analysis does not consider the impacts of power lines from the Lace River Hydroelectric Project to the Kensington Gold Project.

Response to Comment 45-4

Please see the response to Comment 45-1.

Response to Comment 45-5

Please see the responses to Comments 45-1 and 26-8.

Response to Comment 45-6

Please see the response to Comment 45-1. The Final SEIS states that the effects of wastewater discharges, sedimentation, and accidental spills would not be significant. Please see the responses to Comments 18-26 and 26-15, which are related to wastewater discharge and the potential for spills.

subsistence fishing. The 1992 final environmental impact statement (FEIS) indicates that Pt Sherman is not a major subsistence area. That implies an overly narrow interpretation of subsistence and personal use, and we find no mention of the fact that most subsistence and personal use fish in upper Lynn Canal pass very closely to Pt Sherman. The Forest Service also needs to anticipate how increased road access would combine with a high number of new residents in creating increased pressure on local fisheries. And finally, federal agencies need to address potential long-term impacts to marine resources from human-caused increases in sedimentation and turbidity. 45-6 (cont.)

Wildlife. Cumulative impacts to wildlife are not mentioned in the DSEIS. This is a serious omission given the fact that new development projects have been proposed for the Berners Bay area since the 1992 FEIS was completed and in light of the fact that the document lists black bear, brown bear, gray wolf, mountain goat, mink, bald eagle, and Vancouver Canada goose as species of special concern that would be impacted by the Kensington project (page 3.49). The 1992 FEIS indicates that local populations of mountain goat and black bear would experience substantial impacts. The 1992 FEIS also acknowledges the possibility of cumulative impacts from both the Kensington and Jualin mines to wildlife but does not feature an analysis of these impacts in any meaningful fashion or discuss whether such impacts are acceptable. 45-7

Mountain goat winter range on the ridge between Sweeney Creek and Lynn Canal is of particular concern in considering impacts from several projects in the area. Increased hunting pressure alone, resulting from factors mentioned above that would affect marine resources, could cause substantial reductions in game animals. The approximately 250 workers on site would be prohibited from hunting, trapping, and harassing animals in the "project area" (a term in need of clarification). However, we understand that they could hunt and trap in the general area. Add to this a workforce from another mine, a substantial population at Echo Cove, and increased road and helicopter access, and local impacts to wildlife populations could be severe. We find no mention of the fact that the Kensington Mine would substantially bisect, and therefore eliminate, wildlife travel corridors along the east side of Lynn Canal. This, in conjunction with other projects mentioned above, could cause disruption and displacement to species that are sensitive to human encroachment and disturbance. Certainly any disturbance caused by additional helicopter exploration or helicopter tours in the area would be an additive factor. It is our understanding that species found in the mine area and which are classified as endangered or threatened in at least part of their range include the peregrine falcon, the humpback whale, and the Stellar sea lion. The impacts of transportation of personnel and supplies to the mine site on whales and sea lions must be considered in conjunction with impacts from other projects. 45-8

Birds of concern include nesting bald eagles, the Queen Charlotte goshawk, and the marbled murrelet. During all seasons of the year, marbled murrelets utilize most of Lynn Canal, including the Pt. Sherman and Berners Bay area. The areas encompassed by the Kensington Mine, the Jualin Mine, the proposed Juneau access road, and other projects should be surveyed for nest sites for these and other sensitive bird species, and cumulative impacts should be assessed before any of the projects are permitted. 45-9

Recreational and Visual Values. The DSEIS does not mention cumulative impacts to 45-10

Response to Comment 45-7

Please see the response to Comment 18-19.

Response to Comment 45-8

Please see the response to Comment 18-20.

Response to Comment 45-9

Birds of concern were considered in the analysis for the 1992 FEIS. The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Response to Comment 45-10

Please see the responses to Comments 45-1 and 26-8.

recreation of the above mentioned projects, except by implication under Visual Impacts (page 4-67). The Berners Bay area is a popular wilderness recreation area for Juneau residents, and the entire east side of Lynn Canal is utilized commercially or recreationally to some extent by kayakers, fishers, hunters, sightseers, and photographers. At present, most of Lynn Canal, except for the towns of Haines and Skagway, is in pristine or nearly pristine condition and rivals Glacier Bay National Park in terms of scenic qualities. The cumulative visual, auditory, and recreational impacts of all of the proposed projects in this area could clearly change the present wildland qualities of the area to that of a major industrial zone. This needs to be analyzed and addressed by the Forest Service before considering permitting of the Kensington Mine. The DSEIS downplays the cumulative visual impact of the Jualin Mine by stating that is in a different viewshed from the Kensington Mine. It also implies that motorists on the Juneau road would be visually impacted by the tailings at the Kensington Mine but does not consider the cumulative visual impacts of the road, the mines, and other projects as seen from Lynn Canal. This is a serious misinterpretation of the term "cumulative effects." 45-10 (cont.)

Section (d) of the Wild and Scenic Rivers Act requires federal agencies to consider potential national wild, scenic, and recreational river areas in all planning for the use and development of water and related land resources. While none of the four eligible rivers in the Berners Bay area (Antler, Berners, Gilkey, and Lace) appear to be directly affected by the 1996 redesign of the Kensington Mine itself, NEPA regulations require agencies to consider reasonably foreseeable future actions. Coalition members believe that the SEIS needs to feature an analysis of the direct, indirect, and cumulative effects of the mine and the proposed Lace River hydroelectric project on the eligibility of these rivers. 45-11

Wetlands. It is our understanding that all of the alternatives would disturb at least 250 acres of wetlands in the area, with a permanent loss of at least 51 acres due to the tailings pile. The Forest Service and the Corps of Engineers need to project the magnitude of wetland loss from the Kensington Mine and from other proposed development projects in the Berners Bay area. Potential strategies for the mitigation of wetland losses from the Kensington Mine are discussed later in this letter under the heading "Mitigation." 45-12

Description of Localized Environmental Impacts

Marine Aquatic Resources. The DSEIS seems inconsistent in projecting impacts on Lynn Canal. It claims that "Discharges under Alternatives B and D would not affect Lynn Canal," but later it states that "Characteristics of marine biota are important because aspects of the proposed project, including construction activities, effluent discharges, and/or accidental spills, have the potential to affect biological resources in Lynn Canal." Finally, the DSEIS concedes that "Any water discharged from the Kensington Gold Project site would ultimately reach Lynn Canal . . ." Given this statement, the SEIS needs to indicate the likelihood of an upset in the operation of the mine as well as the impact this would have on resources. 45-13

Freshwater Aquatic Resources. It is unclear, given the intensity of mine-related activity in the vicinity of upper Sherman Creek, how Coeur will protect the resident population of Dolly Varden char. Similarly, it is not entirely clear how anadromous fish below the barrier falls in Sherman 45-14

Response to Comment 45-11

Please see the responses to Comments 45-1 and 26-8.

Response to Comment 45-12

Section 4.8.3 of the Final SEIS discusses the potential impacts to wetlands from the Kensington Gold Project. Each of the other projects potentially affecting wetlands would have to go through the NEPA process, obtain a Section 404 permit from the Corps of Engineers, and be subject to project-specific mitigation requirements. Also, please see the responses to Comments 45-1 and 26-8.

Response to Comment 45-13

Please see the response to Comment 18-10.

Response to Comment 45-14

This subject is addressed in Sections 4.4.2 through 4.4.5 and 4.7.2 of the Final SEIS. The resident Dolly Varden char would be protected from activities in the drainage basin through implementation of BMPs established by the Forest Service and through permit requirements stipulations developed by ADF&G. The monitoring of gravel quality in lower Sherman Creek (see Table 2-3 in the Final SEIS) is designed to detect changes in the incubation habitat of anadromous fish species. Please see the response to Comment 18-12.

Creek will be protected. 45-14 (cont.)

The DSEIS states, "Evidence indicates that elevated metals exist in the tissues of Dolly Varden downstream from the current sediment pond outfall to the Ophir Creek tributary." It is disturbing to learn of existing elevated metals levels in Dolly Varden without a thorough investigation of its cause. The effects from the exploratory phase of this project are small compared to the fully operational phase. If there is already a tissue contamination problem, its source should be determined. 45-15

It is unclear from the DSEIS if the Forest Service and the Alaska Department of Fish and Game (ADF&G) are authorized to allow degradation of fish streams. The DSEIS states that "Alternatives B through D would temporarily eliminate 2,450 feet of habitat in Ophir Creek with fish mortality of 125 to 170 Dolly Varden." 45-16

The DSEIS says that the Forest Service would require the following additional best management practice as mitigation measure: "Avoid construction activities in Sherman Creek and its tributaries during critical life stages of anadromous fish. In general, this would range from adult entry into lower Sherman Creek until fry left the watershed." Assuming that adults enter in June and fry emerge the following spring, it is unclear how Coeur could complete construction under this requirement without significant impacts to Sherman Creek. 45-17

Water Quality. The Coalition's comments on water quality are reflected in Dr. David Chambers' enclosed report and in a March 24, 1997 letter to Ms. Sharmon Stambaugh of the Alaska Department of Environmental Conservation (DEC) from Bruce Baker on behalf of the Kensington Coalition regarding DEC's issuance of site-specific water quality standards for mine drainage discharge into Sherman Creek. 45-18

Coalition members have recognized that proposed levels of total dissolved solids (TDS) fail to meet drinking water standards and would not meet the requirement that increases in TDS "may not exceed one-third of the concentration of the water body." It has been pointed out that reclassification of uses would ignore the stream's existing use as drinking water and would fail to satisfy the anti-degradation policy of the state's water quality standards. 45-19

Coalition members have also believe that the arsenic criterion in the state water quality standards would be exceeded. Although the federal arsenic standard is expected to be changed, it is premature to say what new standard will result from federal rulemaking. 45-20

And finally, Coalition members have cited Coeur's anticipation that Outfalls 001 and 002 will meet state water quality standards with settling ponds and flocculation and have asked whether there is a treatment option if, contrary to Coeur's expectation, water quality standards are not met. 45-21

Water Withdrawals. The instream flow rates of Sherman Creek are projected from data for other watersheds rather than actual rates measured in Sherman creek. The DSEIS states, "A long-term data base has not been established for stream flow in Sherman Creek and its tributaries." This raises the question as to whether projected statistical data are adequate to 45-22

Response to Comment 45-15

Please see the response to Comment 18-11.

Response to Comment 45-16

Please see the response to Comment 18-12.

Response to Comment 45-17

Please see the response to Comment 18-32.

Response to **Comment 45-18**

Please see the response to Comment 4-5.

Response to Comment 45-19

Please see the response to Comment 4-5.

Response to Comment 45-20

Please see the responses to Comments 34-3 and 36-11.

Response to Comment 45-21

As documented in Section 4.4.3 of the Final SEIS, the discharge from the process area settling pond, including treated mine drainage, would meet all water quality standards. Based on existing data, the DTF settling pond would ensure compliance with water quality standards at outfall 002. The Final SEIS notes the feasibility of using similar treatment to the mine drainage system at the DTF if unanticipated exceedances of water quality-based permit limits occurred.

Response to Comment 45-22

Please see the response to Comment 18-7.

ensure protection of aquatic life in Sherman Creek. Of particular concern are the DSEIS statements. "The withdrawals would follow instream flow requirements developed by the Alaska Department of Fish and Game (ADF&G), which would likely prevent withdrawals during December, January, and February," and "All alternatives could require mitigation through the use of alternative ground water sources during low-flow periods." We find no detailed discussion in the DSEIS of how Coeur proposes to augment the in-stream flows if necessary. 45-22 (cont.)

Air Quality. The United States recently signed an international agreement to reduce carbon dioxide emissions in the near future. It seems contradictory to permit an operation that is powered by fossil fuels and proposes to burn 6.5 million gallons per year. This is another reason for there to be a thorough discussion of the proposed Lace River hydroelectric project in the SEIS. The Forest Service should weigh the relative advantages and disadvantages of using diesel fuel, electrical power, and possibly liquified gas. Important considerations include the conservation of fossil fuels and risks to the marine environment. 45-23

Fishing. The Point Sherman area is the habitual corridor to over 50 percent of the salmon returning to all rivers in upper Lynn Canal. The DSEIS states, "Adult salmon returning to all rivers of the upper Lynn Canal occur primarily along the eastern shore . . . The nearshore area off Comet Beach may be a larger shoreline region, providing rearing habitat for pink and chum fry and sockeye smolt." The biological integrity of the Pt. Sherman area is critical to Native and non-Native subsistence users. Projected impacts on these fish populations need to be described. While it may be true that Native subsistence fisheries from Klukwan or Chilkoot do not fish at Comet Beach, any catastrophic event at Kensington would likely affect subsistence users' livelihoods. 45-24

The DSEIS fails to consider adverse effects of a catastrophic failure or spill on commercial, subsistence, charter, and personal sport fishing and fish processing. These activities are important to the monetary and non-monetary economic well being of Haines residents, and the SEIS needs to describe what impacts spills or water degradation would have on them. 45-25

According to the DSEIS, "Executive Order 12962 requires Federal agencies to evaluate the potential effects of proposed Federal actions on recreational fisheries," and "Executive Order 12898 requires Federal agencies to identify and address disproportionally high and adverse health or environmental effects of proposed activities on minority and low-income populations." The health of Alaska Natives, as high-end consumers susceptible to fish tissue contaminants, needs to be protected. 45-26 45-27

Tailings

It would be helpful if the DSEIS provided better information on the occurrence of seismic disturbance and its potential effect on the tailings pile. At a March 26 workshop in Juneau, we understood that the frequency of occurrence of a seismic event sufficient to trigger a catastrophic failure of a saturated tailings pile was approximately 100 years. The Kensington Tailings Facility-Geotechnical Resource Report (Klohn-Crippen, 1997) states on page 22 that seismic settlements could be in the order of five to ten feet and that this could lead to internal disruptions in the drain 45-28

Response to Comment 45-23

Please see the response to Comment 9-1.

Response to Comment 45-24

Please see the response to Comment 18-14.

Response to Comment 45-25

Please see the response to Comment 18-14.

Response to Comment 45-26

Please see the response to Comment 18-15.

Response to Comment 45-27

Please see the response to Comment 18-16.

Response to Comment 45-28

Please see the response to Comment 18-3.

layers, interlayer barriers, and the closure cap, which could allow more infiltration and less drainage ability in the pile The report states that "Seismic deformations of 2 inches to 8 inches could lead to disruptions in the drain pipes within the interlayer developments rock drains, which could reduce their drainage capacity and lead to locally confined zones of saturated tailings." Both of these statements are cause for concern. 45-28 (cont.)

In addition to the points raised in Dr David Chambers' enclosed review, the Coalition urges the Forest Service to include in any action alternative that it selects, a berm that will ensure against tailings pile destabilization in the event of pile saturation, substrate liquification, and a triggering seismic disturbance. It should also be required that any protective berm be installed well before a seismic disturbance causes pile destabilization and possible pollution of fresh and marine water habitats These measures are especially important in light of the DSEIS statement that " there are no case histories for construction of dry tailings facilities of similar design in comparable high precipitation and seismic activity areas." 45-29

Coalition members have also suggested that an impermeable liner should be required beneath the tailings pile. There appears to be an inconsistency in the DSEIS in the description of bedrock below the pile. It states, "Because overlying materials typically have higher permeabilities than fractured bedrock, the bedrock contact may form a hydrologic boundary." This is not to say it "will" form a hydrologic boundary. The DSEIS later indicates that the bedrock is not impermeable in the drainage where the tailings pile is sited: ". . . water is lost through evapotranspiration, infiltration into ground water, and lateral subsurface flow toward Sherman Creek, Sweeney Creek, and Lynn Canal," and ". . . flow from these four streams was not observed to outfall into Lynn Canal via surface flow Rather, observable flow terminated at Comet Beach. The final drainage to Lynn Canal was assumed to occur through the subsurface." 45-30

The DSEIS further states that ". . . any tailings seepage that bypassed the foundation drains would not affect ground water quality because of the inert characteristics of the flotation tailings." The "inert" quality of the tailings pile seepage is dependent on a flawless ore sorting, grinding, and flotation process. It assumes a perfect recovery process. This is a rather broad assumption given the scale of the proposed operation and the realities of mining ore. There is the question of how inert the tailings pile runoff is and whether a liner should be required under the pile to ensure ground water protection. The reason that we raise this issue is that we are unaware of any technology to clean up ground water after it is contaminated, and every effort needs to be taken to protect in advance against its pollution. 45-31

The long-term biological and visual effects of this project are, in large measure, going to be determined by the volume of tailings exposed to the elements It is, therefore, essential that Coeur be required to backfill the maximum amount of its tailings. The DSEIS states, "Due to the swelling and mixing with water and cement, the operator theoretically could paste backfill all of the open stopes in the mine with only about 60 percent of the tailings volume produced at the Kensington Gold Project." Page 2-25 of the DSEIS states that paste backfill cannot be pumped, and this statement is used to justify a 25 percent backfill level A more thorough discussion is needed of the paste backfill process and the reasons as to why pumping is precluded. 45-32

Response to Comment 45-29

Please see the response to Comment 5-1.

Response to Comment 45-30

Please see the response to Comment 18-8.

Response to Comment 45-31

Please see the responses to Comments 18-8 and 18-9.

Response to Comment 45-32

Please see the response to Comment 5-5.

The Coalition requests that the Forest Service ensure that the amount of tailings returned to the mine approaches 50 percent rather than the 25 percent minimum described in the DSEIS, and that the return of tailings to the mine be started soon as possible in order to minimize the size of the tailings pile and the problems that are associated with it 45-33

Monitoring

Fuel Deliveries. The analysis of the fuel delivery plan is inadequate. The DSEIS states, "Under all alternatives, virtually no risk of a spill is associated with a barge sinking." This statement does not consider the circumstances of the site. The unloading facility is directly exposed to severe wind and weather from the north. In describing the sedimentation of Comet Beach, the DSEIS states, "These beaches are exposed to storm-generated waves from the north, which probably results in considerable physical disturbance . . . " Given the weekly delivery of fuel and frequent winter winds that typically blow 30-50 knots from the north for a week at a time, it is highly possible that a barge will eventually become grounded on the nearby reef to the south and spill at least some of its fuel While Coeur has indicated a willingness to avoid landing barges in seas greater than three feet, it is unclear who has responsibility for monitoring and enforcing such a condition. 45-34

The gillnet fleet uses the area extensively from June-October. The Forest Service is urged to cooperate with DEC to ensure that any action alternative that is selected contains the following requirements to prevent or minimize adverse effects of a fuel spill: 45-35

1. No fuel deliveries or transfer when seas are greater than three feet.
2. Tertiary berming around fuel storage facilities.
3. Avoidance of fuel delivery and transfer during fishing openings which vary from 2-5 days per week.
4. Booming around fuel delivery vessels.

Reporting of Violations. We encourage the Forest Service to require that if Coeur learns it is in violation of any federal, state, or borough permit or other requirement, it must notify all agencies within 24 hours, with a written notification describing the nature of the violation and the reasons for it, within three days 45-36

Financial Warranties after Closure of the Mine. The Forest Service needs to clearly state what financial warranties it or the City & Borough of Juneau will require upon final closure of the mine Experiences at other mine sites have proven that damages from unforeseen events after closure can cost taxpayers tens or hundreds of millions of dollars. Therefore, we recommend that the Forest Service work with the Juneau Borough to hire an independent consultant, knowledgeable of mine reclamation and toxic site cleanup costs, to advise on a suitable amount and that, if appropriate, the Forest Service and the borough establish a warranty amount(s) accordingly. 45-37

Citizens Advisory Committee. We understand that Coeur is committed to involving local 45-38

Response to Comment 45-33

Please see the response to Comment 5-5.

Response to Comment 45-34

Please see the response to Comment 36-14.

Response to Comment 45-35

Please see the response to Comment 36-14.

Response to Comment 45-36

Please see the response to Comment 18-29.

Response to Comment 45-37

The final Plan of Operations, which will be completed subsequent to the Forest Service's Record of Decision, will include detailed bonding requirements for the selected alternative. In developing these requirements, the Forest Service is coordinating with State and local agencies, including the City and Borough of Juneau.

Response to Comment 45-38

Requiring such a committee is beyond the scope of the SEIS.

citizens through a citizens advisory committee or CAC. We believe that this concept should be fully described in the SEIS. A CAC was discussed by the Juneau Borough Planning Commission during its original permitting process and was agreed to by the borough, but we understand that action setting it up was deferred. It is also our understanding that Coeur has proposed the following minimum characteristics in order to ensure that a CAC is a fair and representative group. We support this measure.

1. six to nine members, with representation from commercial fishing, mining, business, and environmental groups including at least one member representing Haines, that representatives would serve staggered terms, and that members would be appointed before construction is begun;

2. overall balance of membership so that no groups or interests can dominate it;

3. a general mission to act as an independent clearinghouse for citizen concerns and for reviewing and evaluating mine performance and potential problems;

4. activities to be funded through operator's permit fees to the Juneau Borough;

5. all meetings of the CAC to be open to the public.

45-38 (cont.)

Interagency Technical Group (ITG). We believe it would be in the public interest to describe a concept that we understand has existed for some time, that of an interagency group of technical people whose makeup and role would have the following characteristics:

1. members representing Juneau Borough staff, the Forest Service, the Alaska Department of Natural Resources' (DNR) Water Division, DEC, EPA, the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service. To these we suggest considering the addition of the ADF&G Habitat and Restoration Division and Haines Borough staff. Other governmental agencies, Coeur, and the Kensington Coalition would be invited to participate as adjunct (non-voting) members;

2. a general mission to act as an advisor on technical and scientific matters to permitting agencies, the Citizens Advisory Committee, and the operator, and to determine the proper level of monitoring of on-site activities;

3. activities to be funded through operator's permit fees to the Juneau Borough;

4. all meetings of the ITG to be open to the public.

45-39

Mitigation of Wetland Loss (Public Notice for U.S. Army Corps of Engineers Permit Application)

In addition to the enclosed recommendations by Dr. David Chambers, we believe the SEIS should feature a description of the following concepts regarding mitigation of wetland losses.

45-40

Response to Comment 45-39

In developing the SEIS and related permit and approval issuance, Federal, State, and local agencies have worked closely to ensure consistency and share technical resources. The Forest Service is committed to continuing this coordination during construction, operations, and closure of the project. Establishing a formal Interagency Technical Group is beyond the scope of the SEIS, however.

Response to Comment 45-40

Please see the responses to Comments 18-13 and 18-24.

Because wetlands in the vicinity of the proposed Kensington Mine and other projects proposed for the Berners Bay area are in essentially pristine condition, it will be difficult to undertake meaningful wetlands mitigation efforts in the immediate area of the these projects. However, efforts are currently underway by ADF&G in Haines, in conjunction with Lynn Canal Conservation Inc., the Haines 2005 Habitat Committee, and other interested members of the public, to rehabilitate degraded anadromous fish streams in the Haines area. These include Sawmill Creek, Big Boulder Creek, and others. We suggest that Coeur could help to mitigate some of the wetland loss associated with the Kensington project by contributing to the effort to restore riparian areas near Haines. A minimum three-to-one mitigation to wetland loss ratio is proposed because, on the average, restored wetlands are not likely to be as productive as naturally occurring wetlands that have not been disturbed by human activity. 45-40 (cont.)

Another approach would be for Coeur to be required to contribute financially to a fund for the purchase and protection of local wetlands of biological importance that are threatened by development. This could be administered by a trustee council similar to the Exxon Valdez Oil Spill Fund. 45-41

The 1992 FEIS notes that reclamation efforts "would not be able to replace old-growth [forest] habitats." To the extent that forest lands disturbed by the mine exist on palustrine wetlands, these could be included in a wetland mitigation strategy prior to any permitting of the project. 45-42

And finally, we understand that sedimentation ponds would be left open as mitigation for wetland loss. Concern has been expressed within the Kensington Coalition, and we would like assurance from the Forest Service that this would not result in the bioaccumulation of metals and resulting injury to wildlife which use the ponds. 45-43

In Closing

The Kensington Coalition appreciates the opportunity to review the DSEIS for the proposed Kensington mine project. The Coalition hopes that the Forest Service, EPA, and the Corps of Engineers will adopt the recommendations contained in this letter and its enclosure.

Sincerely,

Bruce Baker

Kensington Coalition Coordinator

Enclosure: Comments on Draft Supplemental Environmental Impact Statement including the EPA Draft NPDES Discharge Permit and US Army Corps of Engineers Public Notice for Permit for the Kensington Mine Project by David M. Chambers, March 31, 1997

Copies: Kensington Coalition member groups

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Response to Comment 45-41

Through issuance of the Section 404 permit, the Corps of Engineers has jurisdiction on the degree and type of compensatory mitigation that would be required for loss of wetlands.

Response to Comment 45-42

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

Response to Comment 45-43

Please see the response to Comment 40-3.

CENTER for SCIENCE in PUBLIC PARTICIPATION
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Comments on

Draft Supplemental Environmental Impact Statement
including the
EPA Draft NPDES Discharge Permit
and
US Army Corps of Engineers Public Notice for Permit
for the
Kensington Mine Project

by

David M. Chambers

March 31, 1997

I. Draft NPDES Discharge Permit

Fact Sheet, p. 24. If the State adopts site-specific standards, the site-specific standard in Sherman Creek for sulfate will be 500 mg/l. If adopted, this is no longer a secondary MCL, but a site-specific standard. This standard should be listed as an Applicable Water Quality Criterion, and be enforced under the NPDES permit. 45-44

In addition, Table VI-2 lists an aquatic chronic criteria for iron of 1000 ug/l. Yet Table 1 Limitations for Outfalls 001 and 002 in the Draft Permit does not list a Effluent Limitation for iron. Why doesn't Table 1 of the Draft Permit include a limit of 1000 ug/l for iron? 45-45

Fact Sheet, p. 25. For metals values that are to be reported as monthly averages, how will the metals that are hardness-dependent be averaged and/or reported if individual values are recorded at different hardness levels? 45-46

Draft Permit, p. 18. Part C. Water Column Monitoring, states that "The Permittee shall collect samples once per month at existing stations 109 and 105, and new stations downstream of Outfalls 001 and 002." The Fact Sheet, on p. 33, states "Water column monitoring shall be performed in Sherman Creek **above and below** outfall 001, ..." This Fact Sheet monitoring requirement was not carried through to the Permit. 45-47

Draft Permit, p. 24. Part i., Quality of Spawning Substrate, calls for monitoring of spawning substrate used by pink salmon. However, this section does not explicitly state the frequency for the monitoring. It is implied that this will be done annually, in July, but this should be specified in the Permit. 45-48

Response to Comments 45-44 through 45-56

Responding to the comments on the NPDES and Section 404 permits is beyond the scope of this SEIS. These comments have been forwarded to EPA and the Corps of Engineers for their consideration in final permit development.

II. Public Notice of Application for Permit, US Army Corps of Engineers
Reference Number 2-900952, Lynn Canal 31

Paragraph 4. Conduit Culverts There will be three relatively long culvert-conduits over portions of the streams in the upper Sherman Creek basin The Public Notice mentions the 380 foot conduit proposed for upper Sherman Creek. There would also be a second road crossing conduit of 300 feet on upper Sherman Creek. The conduit on Ivanhoe Creek would be approximately 200 feet in length. There is no discussion of either of these conduits in the Public Notice. How large would the conduits be? What flows would the conduits accommodate? What would happen in larger-than-design flows? And of most importance, why is there a need for such long conduits to be placed over the streams for road crossings? 45-49

In addition, there is a diversion proposed for Ophir Creek of 862 feet This diversion would route Ophir Creek into Ivanhoe Creek. What effects would this diversion, and the conduits on Sherman and Ivanhoe Creeks, have on the habitat values of these streams? 45-50

All of the above items involve major rerouting and change to waters of the United States There is some discussion of the potential impacts of these diversions/conduits in the DSEIS on pages 4-20 & 21, but the discussion does not answer the questions raised above 45-51

In addition, there is no figure in the DSEIS or Permit Notice that adequately shows what these diversions and conduits would look like Although there are several figures that do show these structures, none of these figures shows them in sufficient detail to judge the size or length of the structures in comparison to the road or mill facilities. 45-52

The Corps of Engineers is the federal agency responsible for permitting changes to waters of the US It should give special attention to these diversions/conduits 45-53

MITIGATION There is no discussion in the Public Notice or the DSEIS (see 2 5 1 Mitigation) of mitigation that would be required for loss of palustrine wetlands related to the construction of the Dry Tailings Facility (113.4 acres) and the Process Area (34.2 acres) Both of these areas are described as wetlands by the Corps (see Public Notice sheet 4 of 40), and both are projected to be reclaimed primarily as uplands (see Public Notice Table 2 1). 45-54

The Corps is obligated to provide mitigation for loss of these wetlands Even though there are arguably adequate wetland resources in the project area to provide adequate wetland habitat values, at a minimum the Corps could identify wetland losses in the project vicinity, for example stream and wetland destruction in Juneau or Haines, areas that have socioeconomic impacts from this project, where higher-value wetlands could be restored as mitigation for the wetlands lost in this project 45-55

The Juneau Wetlands Board has an extensive list of projects available as potential mitigation. There is probably a similar source for mitigation projects in Haines (The Juneau Wetlands Board has been made aware of this situation, and will be contacting the Corps) 45-56

III. Supplemental Environmental Impact Statement

Summary, Surface Water Quality, p. xii. In this subsection the statement is made "Offsite processing of sulfide concentrate under Alternatives B through D would virtually eliminate onsite acid generation potential "

Approximately 30 percent of the ore shows NP/AGP ratios less than 3, and 8 percent of the ore has ratios less than 1 (Appendix D, p. D-2) There is some likelihood in the long term this material, some of which will inevitably be exposed in the mine after closure, could possibly generate acid drainage It would be better to make the statement that most, but not *virtually all*, of the acid generation potential would be eliminated by offsite processing of a concentrate.

45-57

2.1 Issues and Alternatives Development, p. 2-2. There is no discussion of the need for, or choice of, the tailings pipeline in Alternative D Section 4 4 5 *Sedimentation* states "The tailings slurry pipeline would increase the potential for erosion and sedimentation to Sherman Creek, .. " (p 4-37) In comparing the risk of a spill from the tailings pipeline versus truck transport of dry tailings, section 4 12.3 states the probability of an accident that would release 50 tons of tailings is 0.012 per year (p. 4-86) Section 4 12.5 states the annual probability of a spill of 270,000 gallons (approximately 1350 tons @ 10 lbs/gal) The probability of a spill from a truck accident is 10 times that of a tailings pipeline rupture, but the rupture would spill 30 times as much tailings. Which is the better risk to assume?

45-58

The DSEIS has not explained the rationale for selecting the tailings pipeline as its preferred option At a minimum, the agencies should share the results of their reasoning on this conclusion with the public

45-59

2.3.6 Dry Tailings Facility Operation, p. 2-20. In the second paragraph the following statement is made, "Any areas of the ground that were unsuitable for direct waste rock placement would be covered with geofabric prior to rock placement "

Who would determine, or how would it be determined, which areas are unsuitable for rock placement? In addition, an area unsuitable for rock placement suggests potential structural problems for the DTF Would it not be better to specify a minimum density for base material?

45-60

2.3.6 Backfill, p. 2-25. In the first paragraph on this page the statement is made that "Since paste backfill cannot be pumped, .."

This is incorrect, paste backfill can be pumped, normally with positive displacement pumps For example, this is now being used at the Golden Giant Mine in Ontario See also papers by David Landriault, Golder Associates.

45-61

2.3.13 Reclamation and Closure, p. 2-29. There is no justification presented in the DSEIS for establishing a depth for growth media to be placed on reclaimed facilities.

In fact, there are conflicting statements as to the criteria to be applied. The DEIS at p 2-29 states that "Growth media would be applied over the regraded areas to a depth of one-half to one foot, . " However, in Appendix D, the Kensington Gold Project Reclamation Plan states "Application depth will vary between 0-2 ft depending upon the facility and terrain " (p.3-1)

45-62

3

Response to Comment 45-57

Please see the response to Comment 43-4. Based on test work and existing mine drawings data, EPA has determined that there is virtually no acid generation potential.

Response to Comment 45-58

Both methods for transporting tailings—pipeline and trucking—have some risk. The Forest Service Record of Decision provides the rationale for selecting the tailings pipeline.

Response to Comment 45-59

Sections 2.7 and 4.12.3 of the Final SEIS describe the potential impacts of both the tailings slurry pipeline and the trucking of the tailings. The Forest Service Record of Decision provides the rationale for selecting the tailings pipeline.

Response to Comment 45-60

These issues will be addressed during the final DTF design phase. Quality assurance monitoring would be conducted during DTF construction. In some cases, unsuitable base material could be excavated and removed.

Response to Comment 45-61

Paste can be pumped; however, the distance and practicality of some pumping operations are limited.

Response to Comment 45-62

The Forest Service has guidelines for reclamation, including the placement of growth material. As indicted in Section 2.5 of the Final SEIS, the final Reclamation Plan would include placement of at least 1 foot of growth material over all areas, except where this would be impractical (e.g., exposed rock faces). This requirement is consistent with the amount of suitable material available at the site.

The SEIS, or the Reclamation Plan, should present a rationale for establishing the depth of soil cover to be required. What is average soil cover in the areas now? What soil depth would be needed to establish the targeted vegetation for reclamation? What is the rate of soil generation for this area? (Soil loss, largely a function of slope, should not be greater than the rate of soil generation, or soils will not hold.)

A typical reclamation requirement for soil replacement for reclamation is a minimum of one foot of soil cover (this assumes additional non-soil base material would be placed under the top soil). Since the requirements proposed for this project are less than that than would be expected for this type of project, an explanation for the proposed standards should be given. Additionally, the standard of 0-2 feet of topsoil proposed in the Reclamation Plan is too arbitrary. It gives field personnel who would implement the plan no real, or enforceable, standard for soil application. 45-62 (cont.)

Another reclamation specification discrepancy appears on page 2-20. The final paragraph on that page says, "The final cover (of the DTF) would comprise 6 to 8 feet of fine and coarse till." However, in Appendix B, the Reclamation Plan implies that the final cover would utilize 5 feet of coarse till." (see Appendix B, p. 3-3 and 4-7)

The reason for establishing a specified thickness for the coarse till in the final cover should be discussed, and the choice of a thickness should be uniform throughout the EIS. 45-63

2.5.2 Monitoring, p.2-33. It is difficult to judge the adequacy of the proposed monitoring in several cases, especially with regard to that which would be required by the Forest Service Plan of Operations (POO), one of the key permits. Another key permit, EPA's NPDES permit, has been issued in a draft form so that the associated monitoring requirements can be evaluated. However, the POO will not be finalized until after the SEIS has been finalized and a Record of Decision issues. At that point the public has no viable way to review the details of the monitoring, or to influence the decisions on monitoring requirements if it believes corrections are needed. 45-64

An expanded outline of the monitoring requirements anticipated for the POO should be presented in the SEIS. For example, from Table 2-2:

- Effectiveness of BMPs in Controlling Nonpoint Sources of Pollution (p. 2-34) - ROD/POO - What are some examples of situations where water quality data might be taken under this provision? What would trigger the collection of water quality data, versus reconstruction of the BMP facility?
- Spawning Salmon Escapement Survey (p. 2-35) - ROD/POO - How comprehensive will the surveys be? Who will do the surveys, and who will fund the surveys? 45-65
- Aquatic Habitat Characteristics (p. 2-36) - ROD/POO - What type of sampling will be done? In what locations? Who will do the surveys, and who will fund the surveys?
- Vegetation (p. 2-36) - Forest Service - What vegetation criteria will the Forest Service use? How will revegetation be monitored?
- Geotechnical Stability (p. 2-37) - Coeur Alaska and Forest Service -
  - Tailings Structure. Construction Methods - Quality control in the design and construction of the DTF is extremely important. What will the Forest Service's role be in this process? How will construction be monitored by the Forest Service?

4

Response to Comment 45-63

Please see the responses to Comments 32-35 and 40-11. The information presented in Section 2.3.6 of the Draft SEIS regarding the depth of coarse and fine till that would be used for the DTF final cover is correct. The final Reclamation Plan would have to reflect the final cover materials and depths included in Section 2.5.1 of the Final SEIS, regardless of whether early closure occurred.

Response to Comment 45-64

Please see the response to Comment 5-3. Specific details of the monitoring plans are not necessarily part of the public review process under NEPA. Section 2.5 of the Final SEIS provides a general description of the objectives and requirements of the monitoring plans. Section 2.5 also describes the monitoring-related responsibilities of each permitting agency.

Response to Comment 45-65

Section 2.5 of the Final SEIS has been expanded to address Forest Service monitoring identified by the commentor. The Forest Service would determine the effectiveness of BMPs through periodic water quality monitoring similar to the program at Greens Creek. The operator would monitor spawning gravel escapement and aquatic habitat characteristics yearly, with Forest Service and ADF&G oversight. The Forest Service would require the operator to continue this monitoring using the methods previously employed by Konopacky at the site. The revegetation criteria would be 75 percent of natural cover, as determined by visual inspection by the operator and Forest Service. Also, please see the response to Comment 43-16 related to geotechnical monitoring.

- Tailings Structure Ongoing Performance - What type of monitoring will be required for the completed DTF under each Alternative? A failure of a portion of any of the tailings layers under Alternatives B & C could cause a partial failure of the DTF How will saturation of these layers be monitored? How dense does the monitoring network need to be? How will this monitoring be paid for? 45-65 (cont.)

Does the Forest Service anticipate requiring a monitoring program to that at the Greens Creek Mine? If so. what will the elements of this program be? 45-66

Minimum instream flows required by ADFG should also be disclosed in the SEIS. 45-67

4.1.2 Visual Quality, p. 4-9. In the first paragraph on this page is the statement "The nearest Class I area to the Kensington Gold Project is Denali National Park." Is Glacier Bay National Park not a Class I area? If it is not, please explain why 45-68

4.2.3 Effects Common to Alternatives B through D (Geotechnical Considerations), p.4-15. Several potential failure modes for the DTF are discussed in this section One issue that should be discussed, and is not addressed in DSEIS, is effect of leaving soil or till materials below the engineered base of the DTF 45-69

A herringbone drain system (see p 2-20 and Figure 2-8) would be installed in the material remaining above bedrock, assumed to be sandy blue till (see Figures 3-7 and 3-8). This drainage system would presumably drain the water remaining in these sediments as the weight of the tailings compresses them, as well as drain any water that goes under the diversion system uphill of the DTF. This settling could rupture the compacted till seal at the bottom of the DTF, as well as cause slope or internal failures in the DTF itself 45-70

The concern is that there may be pods of material remaining in the unexcavated till that would compact differentially under loading by the tailings Till materials were estimated to have a hydraulic conductivity of 10^{-6} to 10^{-3} cm/sec, suggesting some significant variations in density (SAIC Technical Resource Document, p. 4-9). Organic materials from the DTF were estimated to have a conductivity of 10^{-2} cm/sec. If any of this material were to exist as pods in the unexcavated till, significant differential settling could occur 45-71

It appears from Figures 3-7 and 3-8 that depth to bedrock is not known for significant areas of the DTF. At a minimum, a more detailed survey of the materials that would remain above bedrock, and a minimum density for this material should be specified, as a part of the construction requirements for the DTF. 45-72

4.3.2 ...(Mine Process Area), p. 4-20. This section describes the two diversion channels that would be built around Sherman Creek (2992 feet) and Ophir Creek, which would reroute Ophir Creek to Ivanhoe Creek (862 feet). Also described are haul road crossings on upper Sherman Creek of 380 feet and 300 feet, and a 200 foot crossing on Ivanhoe Creek. 45-73

The figures in the DSEIS, and the Corps Permit application, do not adequately show these facilities. These facilities could all significantly impact the streams in question There should be much more discussion as to why it is necessary to have such long culverts for a haul road crossing.

Response to Comment 45-66

The Forest Service is developing a nonpoint source and construction-related water resource monitoring program similar to the one at Greens Creek. This will be incorporated into the final Plan of Operations. Section 2.5 of the Final SEIS outlines the components of this program.

Response to Comment 45-67

Since publication of the Draft SEIS, ADF&G and ADNR have established values for instream flows on upper Sherman Creek. Table 4-16 of the Final SEIS presents these values. Also, please see the response to Comment 18-7.

Response to Comment 45-68

The Clean Air Act of 1977 specifically mandates national parks existing as of August 7, 1977, to be Class I areas. Since Glacier Bay was named a national park after 1977, it is not specifically or automatically a Class I area. Currently designated a Class II area, Glacier Bay National Park is eligible to become a Class I area through redesignation by the State of Alaska. Given the distance from the Kensington Gold Project site to the boundary of Glacier Bay National Park, little impact is expected from the Kensington Gold Project on the visual or air quality of the park.

Response to Comment 45-69

The analysis performed for this SEIS considered the impact of soil or till under the DTF. Under the outer shell, all loose and soft material must be removed. Within the DTF, the only issue would be the potential for excessive settlement from the peat. The glacial soils are medium dense to dense, and settlement would be very small. Most of the settlement of the peat is expected to occur under the first few lifts of tailings. Several seismic surveys, in addition to test pits and boreholes, provided no evidence of deep peat deposits. Therefore, the underlying materials probably would not influence DTF stability. This material would be removed as necessary under the foundations for the contingency berm (Alternatives B and C) and the structural berm (Alternative D).

Response to Comment 45-70

The peat and till material remaining below the DTF would settle some, and the drainage system would expedite settling. Because of the relatively thin layer of remaining peat and till and relatively dense nature of these materials, however, only limited settling is expected. The drain system generally would collect any seepage. At closure, capping would minimize infiltration. The potential effects of settling within the tailings on DTF drainage is a more significant issue. This uncertainty is one of the primary factors in the Final SEIS determination of a low to moderate risk of saturation and the determination of the selected alternative, including the engineered structural berm, in the Forest Service Record of Decision.

Response to Comment 45-71

Please see the response to Comment 45-69.

Response to Comment 45-72

The *Kensington Gold Project, Prediction of Seepage Quality from the Dry Tailings Facility* (SRK, 1996c) presents a detailed discussion of the sampling program and the characterization of soils, deposits, and the geology of the Terrace Area drainage basin. Section 3.7.2 of the Final SEIS summarizes the results of these studies. The complete document is available in the SEIS Planning Record. The sampling program was consistent with those undertaken for other similar structures. The depth to bedrock varies in this area between 2.5 and 10 feet across the site. The geotechnical, consolidation, and hydraulic properties of these tills and the sorted glacial deposits in this area were incorporated into the DTF conceptual design. Also, please see the response to Comment 45-70.

Response to Comment 45-73

Please see the response to Comment 5-2. Figure 4-3 has been added to the Final SEIS to show the locations of the proposed stream crossings.

4.4.2 ...Haul Road, p. 4-28. If Alternative D, with the tailings pipeline, is implemented, would it still be necessary to have a 60-foot width for the haul road? If this width is still necessary to haul waste rock to the DTF, doesn't this make the pipeline option somewhat less attractive, because the large width haul road would still need to be constructed? 45-74

4.4.2 ...Effluent Quality, p. 4-30. In the first paragraph is the statement "The flotation tailings from the two runs had sulfide concentrations of 0.027 and 0.04 percent (see Appendix D)." Appendix D does not contain this information. 45-75

4.4.3 ...DTF Effluent, p. 4-34. In this section it has been concluded that the effluent from the DTF would not require treatment, other than settling, prior to discharge. Based on the technical data presented in the Technical Resource Document for Water Resources by SAIC, there is some concern for this conclusion, as explained below:

In section 5.5.3 of the Technical Resource Document (p. 5-18) is the statement, "... values reported below the detection levels in all samples from the individual sources have been assumed as zero within the mass balance equation." This is not the most conservative approach to calculating the mass balance figures. This approach tends to underestimate the amount of a contaminant, especially if the contaminant is present in the discharge at a level just below the detection limit. 45-76

In addition, the results of the tailings water analysis, presented in Table 6-13 of the Technical Resource Document, lead to some concern because the detection level used for some of the constituents is somewhat high, in particular for lead (20 ug/l) and silver (5 ug/l).

Although these discrepancies are not likely to lead to any major problems in predicting the character of the DTF discharge, the possible effects due to the zero detection assumption and detection levels utilized for lead and silver should be analyzed and explained in the SEIS or a technical support document 45-77

4.4.4 ...Effects of Alternative C (Marine Discharge), p. 4-36. There is no discussion in this section of the possible effects that the freshwater discharge into Lynn Canal might have on salmon migration.

The discharge would be close to shore, and near-surface. Could the discharge, even though it is small, be a barrier to, or divert, migration along the shoreline of Lynn Canal? Are there any other effects the unmixed freshwater discharge into Lynn Canal might have? 45-78

4.4.6 Cumulative Effects, p. 4-38. The statement is made that "If developed, the Jualin Project would be located within the Johnson Creek Watershed to the west of Sherman Creek." Johnson Creek is east, not west, of Sherman Creek. This typo also appears on page 4-57. 45-79

4.6.6 Cumulative Effects, p. 4-50. This section states "If and when a final development plan is proposed to the Federal Energy Regulatory Commission and the operator agrees to purchase power, the effects on marine water resources would be evaluated under the NEPA process for the Lace River Project an/or modifications to the Kensington Gold Plan of Operations." (p. 4-50) 45-80

Response to Comment 45-74

The width of the haul road would remain the same. The primary difference between the pipeline and trucking options for tailings is spill risk and potential impacts. Section 4.12 of the Final SEIS discusses these analyses.

Response to Comment 45-75

The reference to Appendix D in Section 4.4.2 of the Draft SEIS was changed to the *Technical Resource Document for Water Resources* (SAIC, 1997a) in the Final SEIS.

Response to Comment 45-76

While perhaps not the most conservative approach, EPA believes characterization of DTF effluent is a reasonable worst-case evaluation for the following reasons:

- Zero values have only been used where all samples were observed below the detection limit.
- The inert nature of the tailings and the use of the highest concentration among flotation effluent and tailings leachate analyses.
- The use of mine drainage characterization data (90th percentile concentrations) to describe waste rock runoff.
- The use of DTF area stream characterization data for reclaimed area runoff; this stream generally should not contain any toxic pollutants.
- The assumption that enhanced settling would not provide any metals treatment; some undissolved pollutants would be removed.
- The use of leach test results for coarse till drainage.

Response to Comment 45-77

All analyses were completed using standard EPA methods with acceptable detection limits for the types of samples and analyses. Please see the response to Comment 45-76 regarding why EPA believes the characterization of DTF effluent was conservative for all parameters. In determining the flotation tailings water characteristics on a parameter-by-parameter basis, EPA used the data from both the leach tests cited by the commentor and the pilot mill flotation effluent testing. In the pilot mill flotation effluent testing, the detection limit for total lead was 2 µg/L and the detection limit for total silver was 0.008 µg/L.

Response to Comment 45-78

Please see the response to Comment 5-4.

Response to Comment 45-79

The commentor is correct. The revisions to cumulative effects eliminated the errors cited in the comments. The Final SEIS has been modified accordingly.

Response to Comment 45-80

Please see the response to Comment 45-1.

This statement suggests an attempt to avoid making an analysis of what the cumulative effects of the Lace River and Kensington projects might be There should be a discussion of possible effects, especially since the presence of the Kensington Project is likely to encourage development of the hydro facility 45-80 (cont.)

4.8.2 ...Cumulative Effects (Vegetation), p. 6-60. There is little to no discussion of the Cumulative effects of timber harvesting, sensitive species, and old growth forest due to ancillary developments to the Kensington Project The Lace River Project, the Juneau-Skagway highway extension, and the Gold Belt Echo Cove project have all been proposed since the issuance of the FEIS Their cumulative impacts on these resources should be addressed 45-81

4.11 Socioeconomic Resources, p. 4-67. One of the long standing concerns of the fishing community has been the potential economic effect of a spill, or other contamination from a discharge into Lynn Canal, on the market for seafood products from Lynn Canal Even if contamination did not cause actual immediate or long term harm to fisheries resources, just the perception of such a possibility could affect seafood markets 45-82

Both the FEIS and the DSEIS are silent on this issue. The SEIS should discuss the economic potential at risk along with the other economic resources mentioned

4.13 Subsistence, p. 4-90. The potential cumulative effects related to the Kensington Project have changed since the FEIS. The potential of developing the Jualin Mine was not mentioned in the FEIS There are now the additional potential projects of the Lace River Project, the Juneau-Skagway highway extension, and the Gold Belt Echo Cove project All could impact subsistence resources 45-83

The potential effects of these cumulative developments on subsistence should be discussed

Appendix B, Reclamation, 4.3 Closure Criteria, p. 4-10. The Reclamation Plan has proposed revegetation criteria to determine reclamation success. The proposed criteria are "After three years, at least 30 percent live cover will be established to meet reclamation objectives and bond release." (Appendix B, p 4-10)

This release criterion seems to be somewhat lenient in light of fact that it could easily be met with manual reseeding, or perhaps no manual revegetation at all

More stringent revegetation criteria should be adopted for the Kensington reclamation 45-84

Following are some examples of revegetation criteria from a recent mining EIS in northern Montana Variants of these criteria might be more appropriate for Kensington revegetation

> "Vegetation cover must achieve 90 percent of that demonstrated in adjacent, natural communities of similar composition and location to be acceptable." FEIS, Zortman and Landusky Mines, March 1996, p 2-226

> "To enhance the probability of long-term reclamation success, soil loss from reclaimed areas must be less than 2 tons/per/acre/year." FEIS, Zortman and Landusky Mines, March 1996, p 2-226. [Note: 2 tons/acre/year is the calculated rate of soil gain for this location]

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Response to Comment 45-81

Please see the response to Comment 45-1.

Response to Comment 45-82

Please see the response to Comment 18-14. Risk perception studies involving hazardous materials release events suggest that the market could be affected by the perception of harm, as well as from actual harm, to resources or commodities. Usually, this is the result of societal fears about a product as information about an event is transmitted through the media. Although impacts to a commercial fishery from perceived risk associated with environmental contamination could occur, it is not possible (given the available data) to quantify the probability or the effect. Section 3.9.3 of the Final SEIS includes estimates of the value of the Lynn Canal fishery.

Response to Comment 45-83

Please see the response to Comment 45-1.

Response to Comment 45-84

Thank you for your comment.

"Soil cover would be placed in at least a 12 inch thickness on all disturbances. ..." FEIS, Zortman and Landusky Mines, March 1996, p. 2-228. 45-84 (cont.)

Appendix D, Geochemical Characterization of Ore Body. The DEIS has concluded that there is essentially no risk of acid mine drainage from waste or mine rock at the Kensington Project (see, for example, section 4.4.3). This conclusion is not supported by the technical information presented in the DEIS.

The concern is for potential acid drainage coming from the mine itself after closure. 8.1 percent of the ore samples tested had NP/MPA ratios of less than 1, and an additional 21.8 percent had ratios between 1 and 3 (Appendix D, p. D-2). Several individual samples had sulfide contents in excess of 10 percent (see Table D-1, p. D-3). Humidity cell tests were evidently only run for 20 weeks, which is probably not long enough to provide a good indication of acid generating capability with rock material of this type - both high acid generation and high buffering capability. In addition, the results from the humidity cell testing presented in the DSEIS are averaged results - Table D-6. It is very difficult to glean results from both static and kinetic tests when only averaged results are presented. Conclusions drawn from averaged results in both static and kinetic testing should be used very cautiously. 45-85

The FSEIS should present more individual test results in its appendices, especially from the kinetic testing. Conclusions drawn from the results of the kinetic testing in particular should be more conservative - i.e. that there is some non-negligible potential for acid mine drainage from residual ore material in the mine rock that is not removed for processing 45-86

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Response to Comment 45-85

Please see the response to Comment 43-4. Static and kinetic acid generation tests were conducted using standard EPA methods. It is important to note that water draining from the Kensington adits historically has shown no evidence of acidification. In addition, with removal of the sulfide ore for offsite processing, the mine workings are not expected to generate acid after closure.

Response to Comment 45-86

All kinetic humidity cell test data are presented in their entirety in Appendix C of *Review of Development Rock, Ore, and Tailings Characterization Testing, Kensington Gold Project, Alaska* (SRK, 1996a). The Final SEIS and *Technical Resource Document for Water Resources* (SAIC, 1997a) summarize all of the extensive acid testing and leachability analyses conducted on ore, waste rock, and flotation tailings samples. These data, along with the existing mine drainage monitoring results, support the conclusion that there is virtually no risk of acid generation. Both of the documents referenced are included in the SEIS Planning Record.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

April 7, 1997

RECEIVED

Roger Birk
EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, Alaska 99801

Dear Mr. Birk:

The National Marine Fisheries Service (NMFS) has reviewed the Kensington Gold Project Draft Supplemental Environmental Impact Statement (DSEIS). We offer the following general comments.

We appreciate the efforts that have been taken since release of the Environmental Protection Agency's Technical Assistance Report in 1994. We believe that Alternative B, the proposed action, eliminates many of the concerns generated by previous scenarios, including the tailings impoundment, marine discharge of impoundment effluent, and on-site cyanide processing. 46-1

NMFS does have continued concerns regarding the displacement of wetlands, the questionable quality of waste water and runoff, and the potential for extensive cumulative impacts in and around the Berners Bay area. The issue of cumulative impacts is fractured within the discussions of the development alternatives. Cumulative impacts are not adequately addressed in this document. Cumulative impacts include the development of Goldbelt Corporation's lands on Echo Cove for mine service facilities, proposed construction of a Juneau access road, proposed development of a hydroelectric facility on the Lace River to generate power for mine development, and facilitation of other mine development in the Berners Bay area. 46-2

Fuel use and storage have created problems in similar projects in southeast Alaska. A program of comprehensive monitoring to assure that all fuel lines, handling operations, and containment facilities are in compliance should be documented in the DSEIS. Even small amounts of petroleum entering marine waters could effect sensitive herring stocks. 46-3

RESPONSES TO COMMENTS
Commentor No. 46: U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Steven T. Zimmerman, Ph.D.

Response to Comment 46-1

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

Response to Comment 46-2

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Response to Comment 46-3

Please see the response to Comment 18-26.

The dry tailings disposal area will displace more than 100 acres of palustrine wetlands. Increasing the total percentage of tailings backfilled into mine adits would reduce the size of the disposal area and could reduce the risk of sloughing or collapse. 46-4

Finally, no mitigation is offered for the loss of extensive wetland areas displaced by this project. Coeur Alaska should examine and pursue opportunities to ameliorate, restore, and/or enhance wetland areas and anadromous fish streams impacted in other locations along Lynn Canal. 46-5

Sincerely,

Steven T. Zimmerman, Ph.D.
Chief, Protected Resources
Management Division

cc: FWS, ADEC, DGC, Juneau
ADFG, Douglas
EPA, Anchorage

Response to Comment 46-4

Please see the response to Comment 5-5.

Response to Comment 46-5

Please see the response to Comment 18-13.

Headquarters:
217 2nd Street, Suite 201
Juneau, Alaska 99801
(907) 586-2323 FAX 463-5515

ALASKA STATE CHAMBER OF COMMERCE

RECEIVED
MAR 10 1997
Juneau Ranger District

April 7, 1997

Roger Birk, EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, Alaska 99801

Re: Kensington Gold Mine Project

Dear Mr. Birk:

On behalf of the Alaska State Chamber of Commerce, I submit the following comments on the United States Forest Service's DSEIS.

Coeur Alaska has presented Southeast Alaska with an exemplary mine plan, and an important example to other industries of the benefits to industry and community cooperation. Coer demonstrated its strong commitment to Southeast Alaska by working closely with the Kensington coalition (comprised of seven major environmental organizations), the fishing and tourism industries, and the local native community to improve its project. The SEIS was necessitated because Coeur reworked its original project to specifically address needs and concerns expressed by these groups. At this stage, those who oppose the project can only be those who declined to work with Coeur to improve it, or those who had to keep some criticisms to ensure continued support by members who oppose mining under any circumstance. The permitting agencies should reward Coeur for its exemplary efforts by swift approval of its well thought out project. 47-1

I understand that at the public hearing in Juneau, some members of the audience raised concerns about the thoroughness of the cumulative impact analysis in the DSEIS. While the FSEIS should be a legally defensible document, the Forest Service should not stray from its current supplemental assessment and speculate about every conceivable future project in the area. Kensington Mine is located in a remote location and its present permit applications are for a mine plan that does not rely on, or serve as a necessary trigger for, any other reasonably forseeable future or proposed project in the vicinity. Logically, there will be no cumulative impacts caused by the mine. This point should be clarified to a public that believes that a project will necessarily have a cumulative impact if it is the first to develop in an otherwise undeveloped area. 47-2

As a company that has won 15 major national, statewide, and international environmental awards, the Alaska State Chamber is confident that Coeur's request for TDS site specific criterion is at environmentally safe levels that will protect all existing and future uses, not only fishery/aquatic uses, but drinking use as well. Likewise, we trust that the dry tailings facility (DTF) design 47-3

RESPONSES TO COMMENTS
Commentor No. 47: Alaska State Chamber of Commerce, Pamela LaBolle

Response to Comment 47-1

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

Response to Comment 47-2

Please see the response to Comment 8-2.

Response to Comment 47-3

Thank you for your comment.

proposed by Coeur is also environmentally sound and structurally stable. Coeur should be allowed to carefully monitor the DTF as proposed and if saturation does occur then build the contingency berm. Coeur should not be required to build a berm around the facility that may not be needed.

In closing, the Alaska State Chamber of Commerce looks forward to the benefits of Coeur Alaska's environmental leadership and the important economic diversity the mine brings to southeast. The Kensington gold Mine should be expeditiously permitted.

Sincerely,

Pamela LaBolle

Pamela LaBolle
President

cc: Ben Cope, EPA
Victor Ross, ACE

Sitka Tribe of Alaska

Tribal Government for Sitka, Alaska

April 7, 1997

Juneau Ranger District

Mr. Roger Birk
EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, Alaska 99801

RE Draft Supplemental Environmental Impact Statement Kensington Mine Project

Dear Mr Birk:

The Sitka Tribe of Alaska (STA) is the Tribal Government in Sitka, Alaska with over 3000 members. STA is writing in support of the Coeur Alaska, Inc. Kennisngton Mine Project. We believe the changes to the project in response to concerns expressed by Southeast Alaska groups and the Alaska Native and local employment obligatious entered into by Coeur demonstrate a sincere commitment to the environment and the people of Southeast Alaska

Specifically, it is our understanding that the Coeur-Kensignton Mine Project has upgraded its treated effluent mine discharge plans after consulting and working extensively with local Native, fishermen, environmental and community groups in order to avoid a mixing zone and discharge into the marine waters of Lyunn Canal That the discharge under the new plan is easily monitored and the Point Sherman fisheries are now better protected by this environmentally preferred option. 48-1

STA is also aware that Coeur has made a significant commitment to Native and local hire for the Kensington workforce throughout all phases of construction, operation and reclamation. Further, Coeur Alaska and the Berners Bay Consortium, an alliance of Goldbelt, Inc., Klukwan, Inc. and Kake Tribal Corporation, have organized a mining employment training program to cooperate with tribal, municipal and labor organizations in order to identify, recruit, train, and dispatch Alaska Natives and Southeast Alaska residents to the project. This labor organization has already begun working with the Sitka Tribe of Alaska to help Coeur meet the employment goals of the Kensington Project. 48-2

456 Katlian Street • Sitka, Alaska 99835 • (907) 747-3207 • 1-800-746-3207 • Fax (907) 747-4915

RESPONSES TO COMMENTS

Commentor No. 48: Sitka Tribe of Alaska, Larry A. Widmark

Response to Comment 48-1

Thank for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

Response to Comment 48-2

Thank you for your comment.

We support the project and encourage the agencies to permit the project on schedule. This project is environmentally responsible and will benefit the people and economy of Southeast Alaska.

Sincerely,

Larry A. Widmark

Larry A. Widmark
Tribal Chairman

cc: Goldbelt, Inc.
Coeur Alaska

Post-it® Fax Note 7671	Date 4/7/97	# of pages ▸ 2
To Roger Birk	From Aaron Brakel	
Co./Dept.	Co.	
Phone #	Phone #	
Fax #	Fax #	

To: Roger Birk
EIS Team Leader
8465 Old Dairy Road
Juneau, Alaska 99801

From: Aaron Brakel
706 6th Street
Juneau, Alaska 99801

Subject: Kensington Mine DSEIS comments

Date: April 7, 1997

Both the DSEIS and the preceding FEIS fail to consider the need for this project. A discussion of need for the project or its product does not occur in any of the federal, state, or local permitting processes. This is poor public policy and poor natural resource decision-making policy. The EIS should include a discussion of the need for this project and the need for and uses of the gold itself. Given the current massive global stockpiles of gold and the massive production of waste and pollution involved in gold mining, the need for new production of gold should be weighed against the environmental degradation caused by gold mining. 49-1

Backfill

The SEIS should include a thorough discussion of tailings backfill, waste rock backfill and the backfill process. A target of backfilling all stopes should be set. Benefits of maximizing backfill include reduction of Dry Tailings Facility and borrow area footprints and corresponding wetlands impacts. Maximizing backfill would also reduce the number of tailings and other haulage trips to the DTF needed under Alternative B. Reducing the size of the DTF could also reduce the potential for catastrophic failure of the DTF. If all stopes were backfilled, what would the reduction in size of the DTF footprint and borrow area footprints be? How would this affect impacts to streams and other resources? Please discuss the impacts of a range of backfill percentages up to the theoretical maximum. 49-2

Page 2-25 of the DSEIS states that paste backfill cannot be pumped. This statement is unsupported and is used to justify a 25% backfill level. The paste backfill will evidently move freely enough through the pipes with gravity, what prevents it from being pumped? What diameter pipes will be used? What is the best location for pumping stations? What is the best water/cement/tailings ratio? Which type of cement is best? What is the best location for the batch plant? Is it possible to backfill with dry tailings? Is it safe? What delivery system would be used? Trucks? Conveyors? Please include visual aids showing the potential backfill methods, batch plant location and components and batch plant location in relationship to the orebody and projected stopes. 49-3

Dry Tailings Facility

I support dry tailings disposal as the best method of tailings disposal for this mine after backfill has been maximized. Dry tailings disposal is a very substantial improvement in this project. 49-4

I support early construction of an engineered structural berm as proposed in Alternative D. Construction of the berm is the best protection against catastrophic failure of the DTF in the event of tailings saturation. I support trucking dry tailings from the process area over piping tailings slurry. I would prefer to keep the dewatering facility in the process area. I am concerned about erosion and mass wasting on the uphill (east) side of the DTF. Over time (particularly after closure) water could become trapped against the DTF. If the outer layer of the DTF failed, the tailings could potentially become saturated. 49-5

Please discuss the how multiple earthquakes over time will affect the DTF. At the workshop preceding the public hearing on the DSEIS in Juneau, it was stated that the recurrence of an earthquake large enough to trigger catastrophic failure of a saturated DTF was 100 years. The Kensington Tailings Facility - Geotechnical Resource Report (Klohn-Crippen '97, page 22) states; "Seismic settlements could be in the order of 5 to 10 ft and this could lead to internal disruptions in the drain layers, interlayer barriers and the closure cap, which could allow more infiltration and less drainage ability in the pile." The report continues; "Seismic deformations of 2 to 8 inches could lead to disruptions in the drain pipes within the interlayer development rock drains, which could reduce their drainage capacity and lead to locally confined zones of saturated tailings." This doesn't look too good for the stability of the DTF over the long haul. If a locally saturated zone within the DTF liquefied in a seismic event, what would be the long term 49-6

1.

RESPONSES TO COMMENTS
Commentor No. 49: Aaron Brakel

Response to Comment 49-1

Section 1 of the Final SEIS presents the purpose and need for the project. An analysis of the need for and uses of gold is beyond the scope of the SEIS.

Response to Comment 49-2

Please see the response to Comment 5-5.

Response to Comment 49-3

Please see the response to Comment 43-1.

Response to Comment 49-4

Thank you for your comment.

Response to Comment 49-5

The DTF would be geotechnically designed to prevent or inhibit infiltration of water through the surface, as well as inhibit the infiltration of ground water. The DTF would be reclaimed to stabilize the surface from erosion. These designs would create a net draining condition over time, thereby reducing the potential for saturation. In addition, the storm water drainage channels above the DTF would be reconstructed during final reclamation to convey the 500-year, 24-hour runoff event. Also, please see the responses to Comments 5-1 and 18-31.

Response to Comment 49-6

Please see the response to Comment 18-3. The design of the berm under Alternative D is not intended to prevent settling and potential saturation in the DTF but rather to prevent failure due to liquefaction under the maximum credible earthquake event. With the berm, multiple earthquake events would not create a greater potential for failure. After closure, the potential for saturation would be much lower than during operations because of the installation of the low permeability final cover.

impact to the DTF stability? Please include a more in-depth discussion of potential seismic impacts including return intervals of earthquakes that could impact the DTF. 49-6 (cont.)

No Project Alternative

The SEIS should include a No Project Alternative. Failure to include a No Project alternative unreasonably limits the SEIS. 49-7

Cumulative Impacts

The lack of discussion and minimal treatment of cumulative impacts of proposed projects in the Berners Bay area is a fundamental and inexcusable flaw in this document.

The Kensington project, Goldbelt's Echo Cove project, the Jualin mine, the Lace River hydro project and the Juneau Access road all will affect Berners Bay. Cumulative impacts of these projects must be addressed. Some of these should actually be treated as "connected actions" under NEPA (Lace River hydro, obviously, the Jualin mine and the Goldbelt proposal, as well.) 49-8

The DSEIS does not address cumulative impacts to recreation and wildlife. Page 3-39 refers all discussion of wildlife and recreation back to the 1992 FEIS. With the exception of Jualin, the FEIS does not discuss cumulative impacts of the above projects on recreation or wildlife. By failing to address cumulative impacts to Berners Bay recreation and wildlife, the DSEIS renders itself invalid. How am I, as a member of the public, supposed to comment on the quality of the DSEIS's treatment of cumulative impacts to wildlife and recreation or it's mitigation proposals if the DSEIS doesn't even address them? Essentially, by going forward to an FEIS, the Forest Service would be denying the public the opportunity to comment on and improve the EIS discussion of cumulative impacts to wildlife and recreation. The Forest Service must identify and disclose cumulative impacts in a **draft** EIS before going on to finalizing the impact statement. 49-9

The Kensington project is the engine driving development of Berners Bay. The Kensington caused Goldbelt to initiate their Echo Cove development proposal. Goldbelt may have shifted their plan somewhat away from a Kensington focus, but it is clear from the master plan described by Skip Gray at the DSEIS hearing in Juneau that the Kensington project acted as a trigger for the proposed development at Echo Cove. Goldbelt's proposal should therefore be considered a direct impact of the Kensington. I would like to incorporate by reference, as part of my comments, all public scoping comments on the Goldbelt Echo Cove proposal. These comments show the public concern over impacts to recreation in Berners Bay and the public concern about cumulative impacts to the area. These comments are readily available to the Forest Service. 49-10

Thank you for the opportunity to comment.

Aaron Brakel

Aaron Brakel

2.

Response to Comment 49-7

Section 2.2.1 of the Final SEIS explains the No Action alternative.

Response to Comment 49-8

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Response to Comment 49-9

Please see the response to Comment 49-8.

Response to Comment 49-10

Please see the response to Comment 49-8.

APR-07-97 08:33 AM P.01

Tongass National Forest

WRITTEN COMMENT SHEET

Public Meeting Location: HAINES

Thank you for participating in the public involvement process for the Kensington Gold Project Draft Supplemental Environmental Impact Statement. Your comments are important to us.

Date: 4/7/97

I AM VERY PLEASED WITH THE PROJECT TO DATE. I APPRECIATE THE ATTENTION AND CONCERN TO THE ENVIRONMENTAL ISSUES THAT COEUR-ALASKA HAS ATTENDED TO. I LOOK FORWARD TO THE ON-TIME START-UP OF THIS PROJECT. 50-1

*** Please Print ***

Name: TYSON VERSE

Address: PO BOX 52 (Street Address) HAINES AK 99827 (City/State/Zip Code)

Please hand in this form or mail by April 7, 1997.
If you have questions, please call Roger Birk, Juneau Ranger District, at 586-8800.

U.S. Army Corps of Engineers

RESPONSES TO COMMENTS
Commentor No. 50: Tyson Verse

Response to Comment 50-1

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

Tongass National Forest

WRITTEN COMMENT SHEET

Public Meeting Location: JUNEAU

Thank you for participating in the public involvement process for the Kensington Gold Project Draft Supplemental Environmental Impact Statement. Your comments are important to us.

Date: 4-7-1997

1. I WOULD LIKE TO SEE AN EVALUATION OF ALL PAST, PRESENT AND FUTURE ACTIONS ON THE WHOLE BERNERS BAY WATERSHED. THIS SHOULD INCLUDE KENSINGTON AND JUALIN MINES, LACE RIVER HYDROELECTRIC PROJECT, JUNEAU ACCESS ROAD, AND GOLDBELT NATIVE CORPORATION'S PROPOSED COMMUNITY-FERRY TERMINAL AT ECHO COVE. 51-1
2. ENSURE THAT 50% OF TAILINGS ARE RETURNED TO KENSINGTON MINE STARTING AT THE BEGINNING OF OPERATIONS. 51-2
3. A PROTECTIVE STRUCTURAL BERM SHOULD BE PLACED AROUND THE 113 ACRE DRY TAILINGS PILE AND TAILINGS PIPELINE. 51-3
4. THE RATIONALE FOR AND EFFECTS OF OF THE LONG UNDERGROUND PIPES FOR UPPER SHERMAN CREEK SHOULD BE EXPLAINED. 51-4
5. DESCRIBE AND EVALUATE MONITORING REQUIREMENTS FOR KENSINGTON PLAN OF OPERATIONS. 51-5
6. DESCRIBE AND EVALUATE EFFECTS OF DISCHARGED MINE DRAINAGE WATER ON MIGRATING SALMON AND OTHER MARINE LIFE. 51-6

*** Please Print ***

Name: PHILLIP L. GRAY

Address: 4410 N. DOUGLAS HWY. JUNEAU, ALASKA 99801

Street Address — City/State/Zip Code

Please hand in this form or mail by April 7, 1997.
If you have questions, please call Roger Birk, Juneau Ranger District, at 586-8800.

U.S. Army Corps of Engineers

RESPONSES TO COMMENTS
Commentor No. 51: Phillip L. Gray

Response to Comment 51-1

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Response to Comment 51-2

Please see the response to Comment 5-5.

Response to Comment 51-3

Please see the response to Comment 5-1.

Response to Comment 51-4

Please see the response to Comment 5-2.

Response to Comment 51-5

Please see the response to Comment 5-3.

Response to Comment 51-6

Please see the response to Comment 5-4.

Tongass National Forest

WRITTEN COMMENT SHEET

Public Meeting Location: ________________

Thank you for participating in the public involvement process for the Kensington Gold Project Draft Supplemental Environmental Impact Statement. Your comments are important to us.

Date: April 7 1997

I was a member of the "Gang of 5" a group of people chosen to take a look at the Jualin mine and its impact on the Berners Bay area. At the time (1988 or so) I was opposed to the building of a Road to Jualin - preferring helicopter access, the other option. But ADF+G pointed out helicopters would be harmful to goat populations. I felt the Road would be a long-term change to the area - I did Not appeal the Road decision - the Road was built and Now Kensington mine project proposes the use of helicopters - Now we have the Road AND helicopters impacting the area. MY POINT: we need cumulative impacts to be studied, looking at all planned development in the Berners Bay area and its impact. 52-1

*** Please Print ***

Name: Judy K. Hall

Address: 1669 Harbor Way (Street Address) Juneau, AK 99801 (City/State/Zip Code)

Please hand in this form or mail by April 7, 1997.
If you have questions, please call Roger Birk, Juneau Ranger District, at 586-8800.

U.S. Army Corps of Engineers

RESPONSES TO COMMENTS
Commentor No. 52: Judy K. Hall

Response to Comment 52-1

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Roger Birk, EIS Team Leader

These comments are concerning the Kensington SDEIS.

This project has significantly improved, but there are still deficiencies that need to be corrected. First are the cumulative impacts--they are not adequately addressed, and must include the Jualin Mine, proposed Lace R. Hydro Project, the proposed Juneau Access Road, and Goldbelt's Berners Bay development. 53-1

Second are tailings. The amount of tailings returned to the mine must be as much as technologically possible. The 25% minimum is not adequate and should be a minimum of 50% or more. The more tailings put back in the mine, the less surface disposal problems there will be. The dry tailings disposal area must have a protective berm around it right from the start--lets prevent a problem instead of having to go back and fix one. In addition, the stored tailings should be mechanically compacted to insure stability. Remember these tailings are going to be there for perpetuity and their permanent stability must be guaranteed. 53-2

Third is monitoring. The Forest Service must describe and evaluate the monitoring requirements for the Plan of Operations. Without this, no one can properly evaluate the severity of adverse effects from the project. 53-3

Fourth is effects on commercial fishing. As a licensed commercial fisherman I have seen fish prices plummet over the years. This is due to increased fish farm competition. The only card Alaska Fishermen hold is the wild fish stocks that are raised in clean unpolluted water. Although the Kensington Mine may not adversely effect the fish it does not look good on the international fish markets. These real or perceived contamination of fish stocks and the resulting economic effects must be evaluated and described. 53-4

Thank you for your consideration of my comments.

Sincerely,

Wayne Carnes 4/7/97

Wayne Carnes
P.O. Box 240258
Douglas, AK 99824

RECEIVED
APR 07 1997
Juneau Ranger District

hand delivered

RESPONSES TO COMMENTS
Commentor No. 53: Wayne Carnes

Response to Comment 53-1

The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Response to Comment 53-2

Please see the response to Comment 5-5.

Response to Comment 53-3

Please see the response to Comment 5-3.

Response to Comment 53-4

Salmon fishing and gold mining have existed together in Southeast Alaska for more than 100 years and are synonymous with the region. It is unlikely that another gold mine in the region would significantly influence market values for salmon. In addition, under the selected alternative in the Forest Service Record of Decision, the discharges from process area and DTF settling ponds would meet all applicable water quality standards at the point of discharge. Also, please see the responses to Comments 4-4, 5-4, and 26-15.

SOUTHEAST CONFERENCE

An Alaska Regional Development Organization and USDA Resource Conservation and Development Council

April 7, 1997
By Fax

Mr. Roger Birk
Kensington EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, AK 99801

Dear Mr. Birk,

Reopening the Kensington Gold Mine north of Juneau will bring economic and social benefits not only to local people and communities, but also to the people and communities of Southeast Alaska as a whole. In the interest of moving the Project forward, this letter contains our comments regarding the Forest Service's Kensington DSEIS.

First, with respect to cumulative impacts. It is important to remember that the document now before the public is a supplement to the Final EIS published in 1992. As such, in discussing cumulative impacts, the Supplemental EIS is required to deal only with impacts that have changed because the project design or plan of operations have changed: comprehensive reconsideration of impacts to include other projects not "on the books" in 1992 is not required. Our reading of the 1992 FEIS and the revised Kensington design and plan of operations suggests little or no change in cumulative impact. Therefore, there is no requirement to re-analyze and re-discuss cumulative impact beyond analysis and discussion already found in the FEIS. 54-1

Second, with regard to the level of detail required in the Suppliment concerning design of the dry pilings pile and associated engineered berm. An EIS need contain only that level of engineering and design detail required to assess the project's impact on the environment: detail in excess of that is both unnecessary and distracting. Whether or not an engineered berm will be necessary is an engineering decision that can only be made during construction and operations. Therefore, engineering details of alternative berm configuration and design beyond that needed to identify the preferred alternative and determine the potential impact of the dry tailings pile on the environment is not required, and constitutes an undue burden on the applicant. 54-2

The Kensington DSEIS shows that the Project can be constructed, operated, and closed out without undue risk to the environment. Uncertainties have been clearly identified and accounted for and environmental restoration and integrity after Project shutdown have been adequately provided for. In terms of content, the document is sufficient as it stands. Southeast Conference therefore urges expeditious finalization of the Kensington DSEIS and issuance of EPA and COE permits needed by the applicant to begin construction

Sincerely,

Berne C Miller

Berne C. Miller
Executive Director

Post-it® Fax Note 7671	Date	# of pages ▶
To Roger Birk	From	
Co./Dept.	Co.	
Phone #	Phone #	
Fax # 586-8808	Fax #	

Copy to: EPA, COE, DEC, CBJ

124 West 5th Street Juneau, Alaska 99801 Tel (907) 463-3445 FAX (907) 463-4425

TOTAL P.01

RESPONSES TO COMMENTS
Commentor No. 54: Southeast Conference, Berne C. Miller

Response to Comment 54-1

NEPA requires consideration of cumulative effects as part of the environmental impact statement. The cumulative effects analysis for each resource has been revised and combined into a separate new section of the Final SEIS. Section 4.14 of the Final SEIS describes the cumulative impacts associated with the Kensington Gold Project.

Response to Comment 54-2

Section 4.2 of the Final SEIS indicates that the DTF could become saturated, although the risk of saturation is difficult to quantify. Because the potential exists, monitoring would be required under all alternatives. Monitoring for saturation during operations would be designed to provide information regarding pile performance and resistance to saturation over the long term. It should be recognized that some degree of error exists in measuring saturation throughout the pile. Detecting areas of developing saturation could take time during monitoring. The risk that saturated zones could lead to failure during operations, however, is very small. If saturation were detected, there would be time to construct a berm and stabilize the DTF. The risk during operations, therefore, has more potential impact on mining operations than on environmental safety. Professional judgment suggests that information and experience are not sufficient at present to guarantee that the pile would be stable at closure. Reassessment would be required on the basis of actual operating experience and the monitoring results.

Under Alternative D, a berm is required until the operator could demonstrate that the facility had enough redundancy and flexibility to remain unsaturated, given the variability in construction expected over the life of the mine. Analysis indicates that the DTF would remain unsaturated; however, this conclusion needs to be demonstrated because this would be the first such facility in this type of climate with this specific type of tailings.

Paul A. L. Nelson and
Citizens for Progress
Box 858
Haines, Alaska
99827

907-766-2458 phone

907-766-2460 fax

April 10, 1997

Mr. Roger Birk, EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, Alaska 99801

Re: Kensington Mine Project,

Dear Mr. Birk,

We are writing in support of the Kensington Mine project. This project has been thoroughly studied by Federal and State agencies, Coeur Alaska, and a host of special consultants. After working closely with local interest groups, Coeur changed its original mine plan in response to concerns expressed by those groups. Then the changes to the project were carefully studied and tested. The end result is an environmentally sound project that will be operated by a company that has demonstrated its commitment to the community and the environment. CBJ and the Forest service should stay on schedule, and permit the project as proposed without adding new conditions. 55-1

(1)

RESPONSES TO COMMENTS
Commentor No. 55: Citizens for Progress, Paul A. L. Nelson

Response to Comment 55-1

The State has proposed TDS site-specific criteria for Sherman and Camp Creeks. If adopted, these criteria would be incorporated into the NPDES permit and Section 401 certification. As discussed in Section 4.4.2 of the Final SEIS, the benign nature of TDS in the effluent and the current monitoring and toxicity test work indicate that TDS in the discharges would not adversely impact aquatic life.

We specifically support the mine project because:

Coeur Alaska has demonstrated a commitment to extracting resources in a way that minimizes impact on the enviroment and on the community that uses and enjoys the resources of the Tongass forest and Lynn Canal.

Coeur's track record in the area of water quality management and reclamation is exemplary. They have won at least 15 major national, statewide and international environmental awards.

Extensive testing confirms that beneficial uses of Sherman Creek will not be adversely impacted by the total dissolved solids, (TDS), present in the mine water discharge. With the site specific criterion (or variance) (SSC) requested from ADEC aquatic uses will be protected as will use of Sherman Creek for a drinking water source. These are the best uses of Sherman Creek waters, as identified by ADEC.

55-1 (cont.)

Thank you for the execellent job you have done in protecting our resources and allowing progress at the same time.

Paul A. L. Nelson

Timothy J Bergman

John L. Spencer

(2)

CENTRAL COUNCIL
tlingit and haida indian tribes of alaska
ANDREW P. HOPE BUILDING
320 West Willoughby Avenue • Suite 300
Juneau, Alaska 99801-9983

April 3, 1997

RECEIVED
APR 03 1997
Juneau Ranger District

Roger Birk, EIS Team Leader
Juneau Ranger District
8465 Old Dairy Road
Juneau, Alaska 99801

RE: Kensington Mine Project Draft Supplemental Environmental Impact Statement

Dear Mr. Birk:

The Central Council of Tlingit and Haida Indian Tribes of Alaska is a federally recognized tribe for the Tlingit and Haida people of the Southeast Alaska Region. As a tribal entity we operate and provide a wide variety of businesses and social services for the benefit of our tribal members. Services such as education and training. In fact our Vocational Training and Resource Center just completed training 30 Southeast Alaska residents, both Native and non-Native, for the Kensington Project.

The first gold mines in Juneau provided the first tangible opportunity for Native people to be employed on an equal basis and to be trained in technical fields. From our perspective, the Kensington Mine is environmentally and socially acceptable because of the changes made by Coeur Alaska after conferring extensively with Southeast Alaska Native organizations, agencies, businesses and interest groups.

The technical merits of the Kensington do more than make it acceptable in terms of environmental impact, it also brings our Tribes real employment and economic opportunity. This project will provide a vision and an incentive for young Native people to become educated in and develop careers in science and engineering. 56-1

Because it is our original homeland and environment, it is the nature of Central Council of Tlingit and Haida Indian Tribes of Alaska to consider the long term interests for this region. As people who have lived in Southeast Alaska for many generations, and foresee living in Southeast throughout the life of the Kensington Mine Project, and long after its closure - we are comfortable with both the social benefits it will bring to our people and with the planning for the environmental mitigation and reclamation of the area.

TEL. 907/586-1432 FAX 907/586-8970

RESPONSES TO COMMENTS
Commentor No. 56: Central Council, Tlingit and Haida Indian Tribes of Alaska, Edward K. Thomas

Response to Comment 56-1

Thank you for your comment (see Chapter 7 in Volume I concerning incorporation of public comments).

We believe Coeur's practice of consultation with all affected local parties and their commitment to training and employing the Native people of Southeast Alaska has produced a model project that deserves to be permitted. The Kensington Project is both environmentally sound and socially acceptable to the Central Council of Tlingit and Haida Indian Tribes of Alaska. 56-1 (cont.)

Sincerely,

Edward K. Thomas
President

cc: Ben Cope USEPA
Victor Ross, COE
Sharmon Stambaugh, ADEC
Coeur Alaska, Inc.
Gretchen Keiser, CBJ

APPENDIX B

U.S. ARMY CORPS OF ENGINEERS PUBLIC NOTICE FOR 404 PERMIT

B. U.S. ARMY CORPS OF ENGINEERS PUBLIC NOTICE FOR 404 PERMIT

The public notice was not available for publication in this Final Supplemental Environmental Impact Statement. Copies will be sent to all persons on the distribution list for the Kensington Gold Project.

APPENDIX C

RECLAMATION

This appendix was excerpted from the following document: Steffen Robertson and Kirsten, Incorporated. 1997. *Reclamation Plan, Kensington Gold Project*. Prepared for Coeur Alaska, Inc.

RECLAMATION PLAN

KENSINGTON GOLD PROJECT

Prepared for:
Coeur Alaska, Inc.
431 N. Franklin Street, Suite 400
Juneau, Alaska 99801

Prepared by:
Steffen Robertson and Kirsten (U.S.), Inc.
7175 W. Jefferson Avenue, Suite 3000
Lakewood, Colorado 80235

January 15, 1997
SRK Project No. 77203.0820

3.0 INTERIM RECLAMATION AND DRAINAGE CONTROL

Interim reclamation maintains soils and directs surface water runoff during the construction phase and during any potential temporary mine closure. The major interim reclamation activities are described in this section.

3.1 Construction Phase Reclamation

During construction preparation, vegetation and trees will be cleared in the lands to be developed. Since topography and geologic formation influence the amount of topsoil and organic material available, they will be removed where possible and stockpiled for reclamation activities. The DTF will not have all organic material removed as only the root zone material will be salvaged to facilitate construction. Tables 3.1 and 3.2 summarize the areas and acreage of each parcel along with the quantity of salvaged topsoil. All merchantable timber will be salvaged, removed or used on-site.

3.1.1 Growth Media/Soil Stockpiling

"Growth media" is defined herein as all native soil (in-place) material with physical and chemical properties capable of germinating and sustaining vegetation growth with or without amendments. At the Project site, the term "growth media" is interchangeable with the term "topsoil".

From initial development up to anticipated cessation of mining, approximately 303,000 cubic yards of growth media is estimated to be available for use in reclamation. Table 3.2 gives approximate excavated volumes within stored locations.

Growth media is anticipated to be limited based on measured depths of the A-horizon. The goal will be to combine A-horizon soil and organic constituents to achieve a 1 ft average depth. Application depth will vary between 0-2 ft depending upon the facility and terrain.

Topsoil and overburden stripping will continue as the DTF and ancillary facilities are developed, and suitable growth media and organic material will continue to be stockpiled or directly placed on areas undergoing reclamation throughout the mine life. All organic matter stockpiles will be located and

shaped so that runoff is controlled to limit ingress to the piles. Stockpiles will be protected from wind and water erosion and will be seeded using seed mixes discussed in Section 4.0.

Soil which will be stockpiled for future use during reclamation was evaluated as part of the *Kensington Venture 1992 Reclamation Plan* ("wet" tailings option) for suitability and are shown in Appendix B.

3.1.2 Interim Monitoring

Once physical reclamation has started, temporary diversions and sedimentation control systems will be monitored on a routine basis by Coeur personnel. These systems will be cleaned, repaired, and altered as necessary. Long-term or permanent diversions and berms will be monitored and maintained as needed until the reclamation surety has been released. Interim reclamation visual monitoring will also include photographic records.

3.2 Concurrent Reclamation During Mine Operation

Reclamation concurrent with mining operations refers to phased reclamation of the borrow areas and DTF. Concurrent practices are similar to final reclamation procedures (Section 4.0) and include fill placement and grading, growth media placement/grading, scarification, seeding, mulching, and fertilizing.

The borrow areas will be reclaimed concurrently as gravel and till sources are spent. Portions of the borrow area and any other ancillary regrading will begin within one year of completed use, and revegetated within 60 days of regrading. Regraded material will be placed over the active area followed by placement of growth media. The area will then be scarified to roughen the texture of the surface, lessening erosional impacts by creating resistance to water and increase soil infiltration rates (Law, 1984). Roughened soil will create micro-areas for seed and moisture stabilization.

Areas intended as open water post-mining land use will not use topsoil as part of the reclamation activities. Topsoil will be placed on fringe areas.

The DTF facility cells will undergo reclamation as soon as practical during operations and includes reclaiming the surface of the facility, as well as construction of diversions, rock covers, and other ancillary features.

DTF cell reclamation will include interlift development along with fill placement/grading, growth media placement/grading, scarification, seeding and mulching/fertilizing as needed. In the event the mine is closed prior to completing the DTF, the interior-slope face between phases and the remaining upper lift active area will be covered with up to 5 ft of coarse till prior to the growth media layer.

Vegetative cover for concurrent and final reclamation is site specific and requires site investigation. There are two vegetation sites: the saturated wetlands and non-saturated uplands. Coeur will evaluate the vegetative success on DTF concurrent reclamation to gather information on the regenerating potential of native species in upland areas. Currently, the seed mix for upland and wetland regeneration includes grasses and forbs that can be broadcast spread (Table 3.3). If during the course of concurrent reclamation it is determined that a modification is required, the seed mixture, application or other appropriate techniques will be evaluated and initiated as required to meet reclamation goals and objectives. Concurrent reclamation revegetation will be recorded with photographs and test descriptions.

Mulch can also reduce wind and water erosion, and may include twig wood chips, sawdust, shredded bark, and gravel. Mulching and fertilization requirements will depend on concurrent revegetation results and may include hydromulching or other appropriate method of placing a mulch material. Mulch material used at the site will minimize potential foreign seed introduction to the project. Optimum techniques for achieving revegetation in final reclamation will be derived from concurrent reclamation.

3.3 Temporary Mine Shut-down Reclamation

Temporary mine shut-down refers to mine and process operations being postponed for a period of not more than three years. This is not to be confused with seasonal mining closures which may periodically occur due to extreme weather conditions. If conditions require temporary closure to extend beyond three years, final reclamation will begin, unless an extension is requested by Coeur and approved by the appropriate regulatory agencies. Temporary closure scenarios which require

modifications to the plan of operation or the reclamation plan will be coordinated with and submitted to the appropriate regulatory agencies for approval.

Seven conceivable closure scenarios have been identified for which costs have been estimated (Section 6.0): closure after initial construction of all facilities but the DTF or closure after completion of each of six DTF cells/phases. Concurrent DTF cell reclamation is possible due to the tailings consistency and landform, enabling closure and reclamation at any time during operations, unlike wet tailings.

Temporary closure may include planned or unplanned cessation of mining and processing operations. During temporary closure, all environmental programs will be maintained according to agreed upon schedules. Interim vegetation, water management, and erosion control measures will be implemented to protect onsite water quality, and interim reclamation activities will continue as planned.

3.4 Best Management Practices

BMPs used for drainage stabilization and erosion control during construction, interim reclamation and final reclamation are discussed in the *Surface Water Management Plan Report* (SRK, 1994b) and *Kensington Gold Project Report on Construction Activity Related to Creek Crossings and Alterations* (SRK, 1996f). BMPs will be used to minimize sediment transport from disturbed areas prior to the construction of more permanent facilities such as sediment ponds. BMPs will also be used in areas that are down gradient from the ponds (i.e., haul roads) to minimize sediment transport. During reclamation, most facilities will require BMPs for drainage stabilization and erosion control.

Examples of BMP erosion control include diversion of runoff, minimizing the size of disturbed areas, limiting the time of exposure, sediment control devices, and establishing permanent vegetative cover. The goal is to prevent erosion where possible and to retain most of the sediment on site where erosion cannot be prevented. The USFS provides guidance for use and installation of BMPs, and these guidelines will be followed as part of the reclamation plan.

4.0 SITE-SPECIFIC RECLAMATION PLAN

This section presents a discussion of reclamation techniques planned after process facility shutdown and decommissioning, followed by site-specific considerations for the DTF and wetlands.

4.1 Facility Shutdown and Decommissioning Activities

Facility shutdown and decommissioning includes removing all operations from service that are not needed to complete reclamation and post-reclamation. These activities are operational and are accomplished prior to reclamation.

The chemical and petroleum storage facilities, process plant buildings, laboratory facilities, office and maintenance shops will be removed from service. Decommissioning activities will include pumping remaining products and neutralizing reagents or chemicals in pipes, tanks, and other items. Tanks will then be cleaned and purged.

Rinsed solutions will be collected and treated according to applicable rules and regulations. All controlled and hazardous chemicals, fuels and regulated materials will be removed from the site for recycling or disposed of in an approved manner.

4.2 Reclamation Process

The reclamation process requires several tasks designed to fulfill the reclamation objectives (Section 1.4): 1) demolition; 2) portal closure; 3) channel stabilization; 4) fill placement and grading; 5) excavations; 6) ripping; 7) growth media placement; 8) growth media grading; 9) scarification; 10) seeding, mulching, and fertilizing; and 11) monitoring. The Project operations will, to some degree, alter the landscape and topography of the site (Drawings RP-7 and RP-8, Figures 4-1 through 4-25). Coeur will reclaim the site to the extent necessary to provide wildlife habitat use and minimize visual impacts.

The topographic characteristics of the DTF will resemble a vegetated hill (Drawing RP-7, Figures 4-8 and 4-9). The process area will be regraded to resemble the surrounding topography, but some of the cut will remain (Drawing RP-8). The sand and gravel borrow area, till borrow area, and mine water

ponds/sedimentation pond will resemble the surrounding topography but modified to include open water and wetlands based on contouring, hydrology, and wetland species invasion (Figure 4-1, 4-2, 4-10, 4-13, 4-14, 4-15, 4-16). All other areas with the exception of the DTF, process area and marine terminal will be reclaimed as wetlands. Earthwork will utilize industry standard heavy equipment.

Temporary sediment control devices (BMPs) that are part of the reclamation activities will be removed when the site specific potential of erosion has been minimized through earthwork and revegetation activities. Long-term or permanent diversions associated with the DTF will be monitored and maintained as needed until the reclamation surety has been released.

The main drainage and DTF sediment ponds will be maintained through reclamation until revegetation has been sufficiently established to limit sediment generation from reclaimed areas. At that time, the ponds will be regraded to establish open water and wetlands. In the event that liners are used, liners above the sediment level will be cut or folded over, and buried in-place. Holes will be poked through the liner if required. Additional cover will be placed over the liner.

Once physical reclamation has started, temporary diversions and sedimentation control systems will be monitored by Coeur personnel as with interim reclamation. These systems will be cleaned, repaired, and altered as necessary.

Drawings RP-7 and RP-8 and Figures 4-1 through 4-25 illustrate post-reclamation topography, while Drawing RP-9 summarizes reclamation tasks by area. The following sections describe each reclamation task.

4.2.1 Demolition

Demolition includes removing all equipment, buildings, above ground power and telephone lines, removing or burying concrete foundations and footers, and removing piping to just below grade. All structures will be removed unless otherwise decided in cooperation with the USFS, State of Alaska and CBJ.

Concrete slabs to be demolished include those at the marine facility which include the hanger, concentrate storage, generator building, aviation fuel tank, off-loading ramp, and heliport pad and

those at and near the process area which include the mill office, maintenance building, tailings filter plant, mine drainage water treatment and other ancillary facilities. Concrete slabs less than 1 ft thick will be broken up with a dozer and buried in place with the exception of the off-loading ramp which will be broken up and buried with other foundations at the beach facility. Foundations other than the ramp will be broken and/or buried during grading (Section 4.2.4). Foundations thicker than 1 ft in the process area will be buried. Footings for facilities including the sediment ponds, domestic wastewater treatment systems, personnel buildings and bridges will be buried as fill material.

Buildings will be taken down and salvaged and building timbers, footers, or foundations buried in place. The explosives storage building which is made of 1-inch steel and lined with plywood, will be cut up and salvaged. All above ground steel tanks will be removed for salvage. Three underground concrete tanks serving the domestic wastewater treatment systems will be left in place underground.

All aboveground piping for these and other facilities will be removed to just below grade and ends will be capped. When electrical power requirements are no longer necessary, generators and associated facilities will be removed from the site for salvage. All above grade lines will be removed, while underground conduit below grade will remain in place.

The bridge and culverts are not necessary when the haul road is removed at post-closure and will be removed or buried. The bridge will be removed and salvaged, while culverts will be buried in place if the drainage configuration allows for minimal erosion. Where drainages are susceptible to erosion, culverts will be removed and disposed of according to the Solid Waste Permit.

All fencing around the process, shop, reagent and explosives storage areas will be removed.

All salvageable equipment, instruments, furniture, buildings, and other material will be removed from the site. Inert construction and demolition debris will be placed in appropriate on-site disposal areas previously approved, buried during grading or removed from the site. This includes foundations, concrete slabs, culverts and other similar items.

4.2.2 Portal Closure

At the completion of mining, the upper portals and ventilation raises from the underground workings will be permanently stabilized and sealed with concrete (Figure 4-25).

Development rock left at the mine adit will be either removed and placed in the DTF as part of its final closure, used in mine adit closure or regraded and reclaimed in place.

4.2.3 Channel Stabilization

Channel stabilization includes returning Ophir Creek to the original location and configuration, removing conduit at road crossings (Drawing RP-3), stabilizing natural intermittent drainages along the road, and stabilizing the Process Area bench diversion (SRK, 1996f). Major factors to be manipulated during waterway reclamation include rainfall and surface water energy, soil type, slope length and gradient, cover, and BMPs. These factors will be evaluated and planned in detail prior to mine closure. BMPs for channel stabilization are discussed in *Kensington Gold Project Report on Construction Activity related to Creek Crossings and Alterations* (SRK, 1996f).

Riprap material for channel stabilization and conduit crossing removal will be obtained by screening on-site materials obtained from blasted rock excavations at the bench and/or gravel derived from the Marine Facilities. No mine waste or significant materials will be placed in the wetlands or waters of the U.S. outside the approved Project footprint. The approximate quantity of material required was estimated at 8,693 cy.

Ophir Creek

The Ophir Creek Diversion will be returned to its natural drainage course at the close of mining and milling activities. The diversion will be regraded to match the natural topography and promote run-off to the original drainage course. Portions of the diversions which meet Ophir/Ivanhoe Creeks will be regraded and riprap placed to promote long-term stability. Riprap will be sized according to the flow data.

Conduit Crossings

Three long-span low-profile arch conduits will be used to route creek flows during Project development (Drawing RP-3). These conduits will be removed at road crossings during reclamation: one over Ivanhoe Creek and two on Sherman creek. The area will be contoured with the surrounding topography to blend with natural shapes. These channel segments will also be stabilized with an average of approximately 18 inches of riprap, with considerations for surface water, soil, slope, cover, and BMPs.

Haul Road Drainage Courses

Six drainage courses in the Sherman Creek drainage basin will be reclaimed where they intersect the haul road (Drawing RP-3). They will be contoured to resemble pre-disturbance conditions and stabilized with 9 inches of riprap.

Main Process Area Bench and DTF Diversions

The main diversion on the east side of the Process Area bench and the DTF main stormwater diversion will be enlarged to accommodate larger scale storm events following reclamation. Again, the modified Process Area bench diversion will be contoured as closely as possible to blend with surrounding topography with an average riprap depth of 18 inches for stabilization. The DTF main stormwater diversion will be lined with approximately 9 inches of riprap in areas not already stabilized.

4.2.4 Fill Placement and Grading

All disturbed areas will be regraded, including the marine facilities, intermediate fuel storage, explosives storage, batch plant, personnel camp, sand and gravel borrow areas, process area sediment pond, DTF sediment pond, till borrow area, Ophir Creek stormwater diversion, haul roads, culverts, stormwater diversions, topsoil stockpiles, DTF coarse till cover, and DTF haul road. Fill placement and grading for similar facilities will be discussed together, while unique facility situations are discussed separately. See Drawings RP-7 and RP-8 for post-reclamation topography. Post-reclamation contour cross-sections are detailed in Figures 4-1 through 4-25.

Haul Roads

All roads will be reclaimed, but the schedule is dependant on monitoring requirements, which will be evaluated near mine closure. Roads not required for long-term monitoring site access will be reclaimed with the other facilities.

With the exception of bedrock outcrops, the haul road fill slopes will ultimately be contoured to blend in with the surrounding terrain (Figures 4-5, 4-6 and 4-7). As discussed in Section 4.2.3, stream crossings and surface water drainage will be reclaimed to their approximate original conditions. The main access haul road and borrow area haul road will be regraded by bulldozing or back dragging the down slope fill area back into the slope cut. The process area haul road from the main access haul road to the north slope will be regraded by flattening the fill slopes from an average of 2H:1V to an average of 2.5H:1V.

Process Area and Development Rock Disposal Bench

The bench cut and fill slopes and surface area will be regraded to control surface water runoff and to blend with the surrounding topography as much as possible (Figures 4-21 and 4-22). Fill material over the bench will average 3 ft, covering process concrete slabs.

Marine Terminal, Laydown Area, Fuel Storage, Explosives Magazine, Batch Plant, and Personnel Camp

Concrete slabs, other than the loading ramp, will be broken up with the bulldozer. Concrete pieces and footings will be buried in fill material. Cut and fill will be contoured to blend with the surrounding topography with a fill quantity equivalent to approximately 1 ft (Figures 4-3, 4-4, 4-11, 4-12, 4-20 and 4-23).

Sand and Gravel Borrow and Till Borrow Area

The borrow areas will be graded in benches with a typical configuration illustrated in Figures 4-13 through 4-18. These areas will be contoured to include open water with a saturated perimeter developing into wetlands.

Process Area Sediment Pond and DTF Sediment Pond

Both sediment ponds will be regraded to create open water areas which blend with surrounding topography (Figures 4-10 and 4-24). The remaining pond cut and embankment fill slopes will be

graded to blend with the surrounding topography providing wetlands around the pond perimeter. Footings will be buried in fill material. No mine waste or other materials will be placed outside the disturbance footprint.

Ophir Creek and Other Stormwater Diversions

The Ophir Creek Diversion will be regraded to blend with the surrounding topography (Section 4.2.3). During construction, excavated common earth will be placed adjacent to the diversion and bulldozed back in place during reclamation grading. Similarly, material excavated during construction of other diversions will be placed adjacent to the diversions or used as embankment fill. The material or fill will be back-filled during grading to resemble surrounding topography.

Haul Road Culverts

Culverts along the haul road will be buried in-place unless the culvert routes runoff from a natural drainage course. Six access road culvert excavations will require backfilling to blend with the surrounding topography (Drawing RP-3). Excavated material will be regraded to match the surrounding topography which allows surface run-off to remain in a stable stream channel.

Topsoil Stockpiles

The topsoil stockpile(s) will be regraded after growth media is dispersed over the disturbed areas (Figure 4-19). Most growth media will be stored at the process topsoil stockpile. However, the growth media stripped at the haul road will be stored at the toe of the road fill slope, and stabilized during the mine life (Section 3.1.1). In addition, temporary topsoil stockpiles will be used at the DTF until concurrent reclamation activities are ready for placement of growth media. Temporary stockpiles will be used in the borrow sources as well.

DTF Coarse Till Cover and Haul Road

If temporary mine shut-down occurs during DTF construction, the interior slope face (between a completed cell and a proposed cell) and the active area of the upper lift will be covered with an additional 5 ft of coarse till (Drawing RP-6).

The DTF haul road will be regraded to blend with the surrounding topography. The down-slope fill area will be bulldozed back into the upslope cut area.

4.2.5 Excavations

Facility excavating includes culverts, conduits, infiltration gallery pipe removal, bench diversions and DTF main stormwater diversion modification. Six haul road culverts will be removed along with three long-span conduits (Drawing RP-3). Infiltration gallery piping will be removed from the Upper Sherman Creek stream bed to a minimum distance of 10 ft outside the stream banks.

4.2.6 Ripping

Ripping will loosen and break-up compaction caused by operation of heavy equipment. Surface manipulation such as ripping is also needed in areas that are likely to develop rills and gullies. Areas requiring ripping include haul roads, the process area and development rock disposal bench, marine facilities, intermediate fuel storage, explosive storage, batch plant, and personnel camp.

Areas of compacted fill surfaces will be ripped with a bulldozer to an approximate depth of 1 ft prior to topsoil placement.

Borrow areas will be regraded and ripped where required to meet post-closure reclamation goals. Approximately 20 percent of the process bench surface area will have concrete slabs buried in-place, while the remaining surface area will be ripped.

4.2.7 Growth Media Placement and Grading

Topsoil and mulch piles will be used for the growth media source. An average of one foot of growth media (0-2 ft variance) will be placed over all disturbed areas excluding slope cuts, riprap or other areas designated in the plan.

4.2.8 Growth Media Scarification

The process of spreading growth media will often create compaction, which is relieved by scarification. A roughened configuration will serve to trap moisture, reduce wind shear, minimize surface erosion by increasing infiltration, and create micro-habitats conducive to seed germination and revegetation.

4.2.9 Seeding, Mulching and Fertilizing

The focus of initial revegetation is on establishing grasses for stabilization that allow for successional plant communities of forbs, alder, and muskeg/spruce. Table 3.3 describes two recommended grass seed mixes proposed for drier upland areas or wetlands. As mentioned in section 3.2, Coeur will evaluate vegetative success during interim reclamation. Dry upland areas include the DTF, marine facility and process area, while the remaining area soils will normally be saturated, resulting in wetlands.

Revegetation will be implemented using hydroseeding which combines seed, mulch, and fertilizer. Generally, seeding is to be implemented from spring until mid-July, but during a period with minimum standing water to maximize germination.

A hydroseeder broadcasting technique combines seeds, water, mulch, fertilizer, and tackifier to provide a favorably moist and protected germinating environment. Hydroseeders are successful in areas like Kensington mine where there is adequate moisture to continue providing moisture for seeds for two to three weeks until the roots are established on the seedlings (Law, 1984).

In this ecosystem, it is desirable to use mulch produced from native tree and shrub twigs in order to encourage an organic mix that decomposes readily into the soil providing nitrogen fixers and nutrients (USFS, 1996). Due to limited quantities of natural mulch, it may be necessary to add another source of wood fiber mulch. If needed for additional protection, straw or grass hay will be used, depending upon availability. If some areas of terrain are too rough for hydroseeding equipment, handseeders will be used to spread seed. Mulch and fertilizer will be spread by hand in these areas.

The recommended rate of application for seed mixtures, fertilizer and mulch is summarized in Table 3.3 (USFS, 1996).

4.3 Closure Criteria

The Project will be considered successfully reclaimed when all activities identified in the plan have been completed. This will include facility shutdown and reclamation tasks such as building removal,

portal plugging, regrading and revegetation where applicable. Revegetation criteria will be used to determine revegetation success.

After three years, at least 30 percent live cover will be established to meet reclamation objectives and bond release. Less than 30 percent live cover on revegetated sites will require that additional action must be taken. Coeur will evaluate the site for potential causes of vegetation failures. The appropriate remedies will be implemented and the site reseeded. This could include scarification, fertilization and seed modification, or similar actions.

If, three years after the second seeding, the site does not meet the 30 percent live cover criteria, it will be assessed for large rills and gullies. If no large rills and gullies are present, the site condition will be deemed appropriate for release. If large rills or gullies are present, Coeur will undertake appropriate regrading activities to correct the rills and gullies. After one season, if the rills and gullies do not return, the site can be released from reclamation bond.

4.4 Specific Considerations

4.4.1 DTF Facility

Concurrent reclamation of the DTF will occur throughout its operational life, and entails physical stabilization of the tailings. With the placement of the tailings, capping and reclamation cover, the configuration of the facility has been designed to promote runoff and allow surface water control (Drawing RP-7). Each lift of tailings results in a bench on the external slope of the facility and creates a lateral drainage path for runoff. Surface water diversions surrounding the DTF will be left in place at closure and reclamation. The ditch to the east of the DTF will be designed to provide long-term maintenance-free control of run-on to the facility, and at closure, the capacity will be increased to accommodate flows in excess of the 500 yr/24 hr storm event.

At closure, drainage from the DTF will diminish and, following reclamation of the surface of the facility, runoff would be similar to pre-development conditions. This will allow sediment pond decommissioning and removal. Sediment pond demolition and reclamation will follow DTF reclamation.

4.4.2 Wetlands

The sediment ponds, sand and gravel borrow, and till borrow areas will be contoured in preparation for pond and perimeter wetland establishment (Drawing RP-8). Regrading activities will provide areas of open water and/or saturated soils over most of the year. All other areas with the exception of the DTF, process area and marine terminal will be reclaimed as wetlands. In addition, the DTF diversions will provide open water and fringe wetland areas. The haul roads, personnel camp, fuel storage and laydown areas, explosives storage area, topsoil stockpile, dissemination area and batch plant will be reclaimed as wetlands habitat areas similar to pre-mining conditions. To begin revegetation, the seed mix will be comprised of the species listed in Table 3.3. Increased areas of open water in combination with natural succession will provide for a more complex ecosystem of native forbs and shrubs for increased diversity.

APPENDIX D

SOIL AND WATER CONSERVATION HANDBOOK

This appendix was excerpted from the following document: U.S. Forest Service. 1996. *Soil and Water Conservation Handbook*. Juneau, Alaska. FSH 2509.22, Amendment No. 2509.22-96-1.

17 - MINERALS MANAGEMENT. Minerals (including oil, gas, and geothermal resources) exploration and development activities on National Forest System lands fall into 3 categories:

Locatable, Leasable, and Saleable.

1. Locatable. The General Mining Law of 1872, as amended, governs the prospecting for and the appropriation of metallic and most non-metallic minerals with a distinct and special value on National Forest System lands that were reserved from the public domain. This applies to most hard rock and placer mineral deposits.

Instruments that analyze and approve locatable mining activities which could affect water quality on National Forest System lands are Notice of Intent to Operate, Plan of Operations, Environmental Analysis, Special-Use Permit(s), Road-Use Permits and State and/or other Federal agency permits and certification (36 CFR 228, Subpart A and FSM 2810).

A Notice of Intent to Operate is required to conduct mining-related activities which may cause disturbance of surface resources on National Forest System lands. The proposed operations described in the Notice must be evaluated and the operator informed that either the operation is exempt from the requirement for a Plan of Operations, or that one is required. If it is determined that significant disturbance of surface resources will likely result from the proposed operations, the operator must submit a Plan of Operations to the District Ranger.

A written Plan of Operations is required from all operators who will likely cause a significant disturbance of surface resources. Prior to approval of the plan, the operator may be required to furnish a bond in the form of a surety or other security to perform reclamation work. All hazardous materials to be used should be listed in the Plan of Operations which shall be submitted to the Forest Service for review and analysis.

A Plan of Operations is also required for construction or reconstruction of roads for access to mining claims if the cross National Forest System lands. Plans of Operation may include supplementary plans for water quality monitoring and erosion control. All Plans of Operation must include how operations are to be conducted to minimize adverse environmental impacts, including compliance with State and Federal Standards.

Special-use permits may also be required and issued for water diversions, water transmission facilities, and electric transmission lines outside of mining claims but needed for mining activities. Permits are required for commercial use of National Forest System roads.

State and other Federal agency permits and/or certification may be required and issued for air quality, water quality, tidelands development, reclamation, disposal and treatment of solid wastes, and so forth. When required, the Forest Service will advise the operator to obtain the appropriate permits or certification. If the proposed operation will involve the use or generation

of hazardous substances, the operator is required to incorporate the permitting requirements of the appropriate regulatory agencies (36 CFR Subpart A 228.8).

2. Leasable. The Mineral Leasing Act of February 25, 1920, as amended and supplemented, subjects certain mineral and energy resources to disposal through leasing actions.

These energy and mineral resources include, but are not limited to, coal, oil, gas, geothermal, oil shale, potassium, sodium, and phosphate. The Mineral Leasing Act for Acquired Lands of August 7, 1947, makes all minerals on acquired (purchased) National Forest System lands, unless otherwise reserved or held as outstanding rights, subject to the provisions of the 1920 Minerals Leasing Act.

The Forest Service and Bureau of Land Management (BLM) make a determination, through the NEPA process, as to whether or not a permit, license, or lease should be issued by the BLM. The Forest Service and BLM develop the stipulations needed to protect water quality and other resource values. Provisions for special-use permits, and State and/or Federal Agency Permits or Certification also apply (36 CFR 228, Subpart E and FSM 2820).

Mitigation measures are developed by an interdisciplinary team during the environmental analysis and are written into the special stipulations section of the permit, license, or lease. Conditions of approval are also developed by the interdisciplinary team to be included in the operating plan.

By interdepartmental agreement, all applications to lease lands under Forest Service jurisdiction are referred to the Forest Service for review, recommendation, and development of special stipulations to protect the surface resources. Administration of oil and gas surface operations on National Forest System land is the responsibility of the Forest Service, but BLM administers the lease.

3. Saleable (Common Variety) Minerals. The Materials Act of July 31, 1947, provides for the disposal and use of common variety mineral materials such as sand, stone, gravel, pumice, cinders, and clay located on National Forest System lands. Disposal can be by sale or free-use permit to private entities or Federal, State, and local units of government, when consistent with good public land management and in the public interest (Refer to 36 CFR 228, Subpart C and FSM 2850).

Common variety mineral materials may be disposed of and developed when their use is consistent with good public land management and in the public interest. Use authorizations will require reasonable erosion control and rehabilitation and revegetation of the surface. Removal may be approved if adequate measures can be accomplished to prevent erosion or stream pollution, and satisfactory arrangements can be made for rehabilitation and restoration as outlined here. New road construction, if allowed, will be located, constructed, and maintained to protect the soil and water.

A project plan or Mineral Material Permit identifies the location and conditions of mineral material removal and disposal. Both will be preceded by an environmental analysis. Project

location, the scope of the proposal, and detailed mitigative measures are developed using an interdisciplinary approach. Compliance with the project design standards, the terms and conditions of the permit, and applicable Federal and State regulations is assured by the Forest Service. Mineral extraction sites can be evaluated for possible post-operation utilization as fish habitat.

All developed mineral material sites will have a site plan developed for the construction and operation of the site. The site plan will include a 1-inch to 400-foot scale map showing the limits of the development, location of structures, top soil stock piles, hazardous areas, and contours and excavated configuration of site.

Operation plans should include the period of operation, equipment and methods of operation, safety requirements (State and Federal), environmental compliance (requirements, monitoring and standards), and a reclamation plan showing final closure envisioned.

17.1 – PRACTICE. Mining Site Conditions, Planning, and Design.

OBJECTIVE. To incorporate soil and water resource considerations into the Plan of Operations for exploration and extraction of locatable and saleable minerals.

EXPLANATION. This is an administrative and preventive practice. The exploration and extraction of locatable and saleable minerals must follow an approved Plan of Operations. This plan should address soils and water resource concerns in the design and operation of the project. It should include descriptions, maps, and sketches of the proposed mine site and onsite riparian areas. Overall plans and schedules for sequential site operations, surface and groundwater monitoring, and site rehabilitation should be presented for the duration of planned mining at the site.

Section 505(a) of ANILCA (PL 96-487) gives special direction for mining in Alaska:

"The Secretary of Agriculture shall...maintain the habitats to the maximum extent feasible, of anadromous fish and other foodfish, and to maintain the present and continued productivity of such habitat, when such habitats are affected by mining activities on National Forest lands in Alaska."

Related BMPs for soil and water protection have been identified here to cover the full scope of planning for mining operations. The following categories, where applicable, should be described in narrative form and/or sketch in the mining Plan of Operation:

1. Existing Site Conditions:

   a. Physical site characteristics:

      – Legal claim location description – Map of streams, diversions, natural ponds, water treatment ponds, tailings, waste rock, and ore piles within and immediately adjacent to the mining claim

- Floodplain Analysis and Evaluation (BMP 12.4)
- Wetlands Analysis and Evaluation (BMP 12.5)
- Riparian Area Designation and Protection (BMP 12.6 and 12.6.1)
- Protection of Potentially Unstable Areas (BMP 14.7)

b. Biological characteristics:

- Amount and type of vegetation
- Presence of fish
- Value of stream aquatic habitat for risk evaluation

c. Stream characteristics:

- Scale map of existing stream pattern
- Water quality
- Timing, magnitude and duration of flood events
- Drainage pattern for overland flow during intense rainfall events

2. Location, Design, Construction, and Operations:

a. Exploratory drill holes:

- Scale map and descriptions of the proposed drill sites, drill hole depths, and use of any drilling compounds

b. Operations camp:

- Scale map and description of the proposed mining camp
- Sanitary facilities/temporary camps (BMP 12. 15)
- Control of solid waste disposal (BMP 12.16)

c. Processing facilities:

- Proposed method of milling or materials handling
- Chemicals (including, where applicable, Material Data Safety Sheets) and chemical processes to be used in milling

- Runoff collection, runoff dispersion, sediment collection, soil stabilization, seeding, and revegetation

d. Access routes:

- Location of transportation facilities (BMP 14.2)
- Design of transportation facilities (BMP 14.3)
- Measures to minimize mass failure (BMP 14.7)
- Measures to minimize surface erosion (BMP 14.8)
- Drainage control to minimize erosion & sediment (BMP 14.9)
- Bridge and culvert design and installation (BMP 14.17)
- Development and rehabilitation of gravel sources & quarries (BMP 14.18)

e. Control, treatment, and disposal of mine drainage and/or mill effluent:

- Slurry and wastewater pipelines
- Water treatment ponds and other facilities

f. Water withdrawal:

- Diversion ditches and headgates
- Water impoundments

g. Waste rock and tailings disposal areas:

- Mineralogic chemical characteristics of waste rock tailings
- Potential for production of metal leachates, acid rock drainage, and sediment
- Runoff collection, runoff dispersion, sediment collection, soil stabilization, seeding, and revegetation

h. Storage and handling of fuel and other toxic material:

- Oil Pollution Prevention & Refueling Operations (BMP 12.8)
- Oil and Hazardous Substance Pollution Planning (BMP 12.9)

i. Clearing and stockpiling of overburden:

- Type of material

- Method and timing for clearing
- Storage location for materials
- Erosion control techniques for the stockpiles
- Right of way and roadside debris (BMP 14.19)

3. Current Year's Mining Activities – Location and Schedule

A schedule of annual operations should be included as part of the annual Plan of Operations for placer mining, and as an update to the hardrock Plan of Operations.

- Map of the area to be mined or developed this year. Mining should be based on sample pits, trenches, or drilling where possible
- When equipment will be moved on and off site
- Timing of proposed mining activities near streams. Instream work on fish streams needs to be scheduled to minimize impacts on fish passage, and fish spawning and rearing habitat

4. Water quality monitoring:

- Location of sampling sites and sampling schedule for any water quality monitoring that is required of the operator
- Soil & Water Resource Monitoring Evaluation
- NPDES Permitting Process

IMPLEMENTATION. Description for mining site conditions, planning, design, and scheduling are given in each mining plan of operation. Responsibility for developing the Plan of Operation belongs to the individual operator and/or lessor. The District Ranger or staff is responsible for reviewing the plan and requesting additional information if necessary. Review can involve using a Forest Service interdisciplinary team.

The District Ranger acknowledges receipt of the Plan and informs operator that the:

1. Plan is approved; or
2. Operations are such that the operator does not need a plan; or
3. Plan needs to be modified or changed to include items necessary to meet the purpose of the regulations in 36 CFR 228 subpart A; or
4. Plan is being reviewed and additional time is needed to complete the review (cannot exceed 60 days); or

5. Plan cannot be approved until an FEIS is prepared and filed with the CEQ (36 CFR 228.5).

REFERENCES. 36 CFR 228, 36 CFR 251, and 30 U.S.C. 612; FSM 2810 and 2827; Reference Manual (Alaska Department of Fish and Game, Jan.1986), Alaska Statute 16.05.840 and 16.05.870. ANILCA (Public Law 96-487) sec 505.

17.2 - PRACTICE. Placer Mining - (NPDES) Permits.

OBJECTIVE. To incorporate soil and water resource considerations into NPDES Permits for placer mining plans of operation for placer mining.

EXPLANATION. This is an administrative and preventive practice. Mining Plan of Operations must explain the annual work, including reference to the handling processing and discharge of mining materials. For placer mining operations using mechanized equipment (including suction dredges), EPA requires the following best management practices be followed for issuance of a NPDES wastewater discharge permit:

1. Surface Water Diversion. The flow of surface water into the plant site shall be interrupted and these waters diverted around and away from incursion into the plant site.

2. Berm Construction. Berms, including any pond walls, dikes, low dams, and similar water retention structures shall be constructed in a manner such that they are reasonably expected to reject the passage of water.

3. Pollutant Material Storage. Measures shall be taken to assure that pollutant materials removed from the process water and wastewater streams will be retained in storage areas and not discharged or released to the waters of the United States.

4. New Water Control. The amount of new water allowed to enter the plant site for use in ore processing shall be limited to the minimum amount required as make-up water for processing operations.

5. Effluent Limitations. The concentration of pollutants discharged in process wastewater from an open-cut mine plant site shall not exceed an instantaneous maximum for: settleable solids of 0.2 milliliters per liter; turbidity of 5 NTU's above "natural" background; and total recoverable arsenic of 0.18 micrograms per liter with no "natural" background measurements.

6. Maintenance of Water Control and Solids Retention Devices. All water control devices such as diversion structures and berms, and all solid retention structures such as berms, dikes, pond structures, and dams shall be maintained to continue their effectiveness and to protect from unexpected and catastrophic failure. Water control and retention structures shall be designed and constructed to contain the design storm runoff event.

7. Seasonal Closure. The operator shall take whatever reasonable steps are appropriate to assure that, after the operating season, all mine areas, including ponds, are in a condition which

will not cause additional degradation to the receiving waters over those resulting from natural causes. (See BMP 17.5)

IMPLEMENTATION. Each mining operator is responsible to file for an NPDES wastewater discharge permit through the U.S. Environmental Protection Agency. The permit requires all mechanized placer mining operations to follow the practices listed above. Enforcement for compliance with these practices is the direct responsibility of the EPA; however, responsibility may also be taken by the ADEC, or by the Forest Service District Ranger or representative.

The District Ranger or representative can do the following in the event of operator non-compliance:

1. Issue non-compliance notice

2. Issue a citation

3. File a court injunction

4. Pursue civil and/or criminal prosecution.

These actions should be coordinated through the Forest Minerals Specialist.

REFERENCES. Federal Register, Vol. 53, No. 100, 5124188, Part 440, Subpart M, USEPA NPDES Permit No: AK-00.

17.3 - PRACTICE. Hard Rock Mining.

OBJECTIVE. To incorporate soil and water resource considerations into the planning process for mining plans of operation for lode mining operations.

EXPLANATION. Hard rock mining consists of developing a tunnel system or, for open pit, the extraction of lodes of ore-bearing rock. Areas of high-grade ore require little surface disposal of wastes; generally these wastes can be backfilled or contained in the areas where the ore has been removed. However, the majority of deposits contain low-grade ore combined with large amounts of waste rock. This requires surface disposal and presents a high potential for degradation of water quality from sedimentation and acid contamination. Drainage of water from the mine is another potential contaminate.

While most development at these sites is below ground, surface facilities include roads, dump or waste disposal areas, equipment storage and service sites, administrative buildings, and supply storage. Associated activities generally include milling operations. Waste disposal from mills present an even greater potential for adverse effects on water quality. Mill waste (tailings) is generally finely ground and transported and stored as a slurry. Storage is generally in surface ponds.

The following applies to hard rock mining operations:

1. Development of surface facilities should conform with appropriate practices as detailed in other chapters. These include measures to protect water quality during exploration, construction, and developmental activities. Related practices are: 12.8, 12.9, 12.10, 12.14, 12.15, 12.17, 14.6, 14.9, 14.15, 14,17, 14.18, 14.19, 14.20, 14.24, 16.4, and 16.5. In addition, practice 14.3 would apply to the location and design of saltwater transportation facilities.

2. Mine waste will be disposed of in a manner to prevent unacceptable damage to the soil and water resources and should include: location of the waste material where sedimentation potential is minimized; stabilization of waste material to prevent movement; treatment of waste with potential for acid production with lime or caustic soda to prevent leaching into surface or subsurface waters; and revegetation of waste disposal sites to prevent erosion.

3. Water from mines should be released slowly to reduce deposition of suspended particulate matter and the introduction of oxygen-deficient water into streams, and to prevent downstream flooding. Water that has become acidic should be treated prior to release. Mine water may be directly used in mill boilers where it may be recycled to reduce contamination of surface waters.

4. When feasible, mill tailings should be returned underground if they will not contaminate the groundwater. Surface disposal sites (ponds) should be sited to prevent embankment erosion by surface water and in a location to minimize flooding potential. Where necessary, construct catchment ponds downstream from the embankment to collect seepage and tailing eroded from the face of the embankment. Use decanting systems, as appropriate, to remove water from the pond after solids separation.

5. When toxic solutions, as a result of dissolved salts or metals, are found as leachates from tailings, monitor and treat effluent as required in NPDES Permits.

IMPLEMENTATION. The Forest Service will designate locations for facilities and waste and tailings disposal sites as identified in the environmental analysis. Detailed mitigation measures are developed by an interdisciplinary team during the environmental analysis and are incorporated into the plan of operations. The mining operator is responsible for the development of the operating plan with review and approval by the Forest Service.

REFERENCES. 36 CFR 228, Subpart A and FSM 2810.

17.4 - PRACTICE. Permits and Administration of Geophysical Operations.

OBJECTIVE. To protect the quality of surface and groundwater from degradation resulting from geophysical activities on National Forest System lands.

EXPLANATION. This is an administrative practice. Geophysical activities will be managed in a manner that is both timely and offers protection to other multiple-use values and management objectives.

Many activities have no effects. However, if effects are identified, standard seismic hole plugging procedures will be followed to prevent contamination of groundwater resources, and

shot hole placement will be examined for potential impacts to other resource values. New road construction, if allowed, will be located, designed, constructed, and maintained to protect the soil and water resources. Roads will be obliterated when no longer needed (BMP 14.24).

IMPLEMENTATION. During the environmental analysis, an interdisciplinary team will be assembled to prepare the appropriate NEPA document that evaluates potential impacts, including cumulative, and any needed mitigation measures for the geophysical prospecting permit. The use of water resources for prospecting activities may require non-Forest Service authorizations or permits.

REFERENCES. Organic Act of 1897 (30 Stat. 34, as amended, 16 U.S.C. 472, 475-478, 480-482, 551); Multiple Use—Sustained-Yield Act of 1960 (74 Stat. 215, 16 U.S.C. 528-531); RPA, as amended (88 Stat. 476; 16 U.S.C.1600-1614); FSM 2860.

17.5 - PRACTICE. Site Closure and Rehabilitation.

OBJECTIVE. To incorporate soil and water resource considerations into the planning process for mining Plan of Operation.

EXPLANATION. This is an administrative and corrective practice. Details of final site rehabilitation measures should be described and mapped in the mining Plan of Operation.

Emphasis should be given to steps for speeding site recovery and enhancing the value of rehabilitated areas to fish and wildlife. Topics addressed should include:

1. Stream rehabilitation, including drawings and descriptions of the final location and configuration for the active stream channel, and fish habitat features intended for the restored stream reach.

2. Floodplain rehabilitation, including: plans for final cleaning and/or stabilization of settling ponds; final configuration of drainage control structures; final site sloping and contouring for drainage control; distribution of stockpiled material; and revegetation sites in disturbed areas.

3. Spoils, waste rocks storage areas, and camp sites should be reshaped to provide proper surface drainage and erosion control. All disturbed areas should be stabilized by vegetation.

4. Tailing disposal sites should be reclaimed to prevent erosion and toxic leachates from entering surface drainages and aquifers. Reclamation measures include liming, contouring, capping and revegetation of tailing piles; use of interceptor ditches to divert surface runoff away from tailing disposal sites; and construction of internal drainage system to collect and safely dispose of water which infiltrates the tailings pile.

IMPLEMENTATION. A description of the site closure and rehabilitation plan is given in each mining Plan of Operation. Responsibility for developing the Plan of Operation belongs to the individual operator and/or lessor. The District Ranger or staff is responsible for reviewing the plan and requesting more detail if necessary. Review can involve using a Forest Service interdisciplinary team.

REFERENCES. 36 CFR 228, 36 CFR 251, and 30 U.S.C. 612; Reference Manual (Alaska Department of Fish and Game, January 1986), Surface Environment and Mining (SEAM) Reclamation Users Guide.

17.6 - PRACTICE. Abandoned Mine Land Reclamation.

OBJECTIVE. To reduce erosion and water quality degradation by sediment and toxic substances from abandoned mined lands and mining facilities through reclamation of these lands.

EXPLANATION. This is a corrective practice. Abandoned mined lands are frequently erosive, bare of vegetation, or are exuding toxic substances and/or sediment into nearby streams. Some sites may pose a threat to public health or safety. Reclamation plans for reducing impacts to soil and water resources are needed for each abandoned mine. Specific practices may vary from site to site, ranging from simple revegetation or reshaping with earth-moving equipment, to restoration to pre-disturbance conditions.

It is important that the site be revegetated with plant species that accomplish the purposes of reclamation. Species may be native or introduced and may be both live plants or seed. Fertility of soil and spoil materials and climate will affect species selection and survival, and soil amendment recommendations.

IMPLEMENTATION. This practice is typically implemented through the development of an inventory of all abandoned mined lands. If a soil and water resource problem area is observed and documented, an interdisciplinary team will assess that abandoned mine site, develop the necessary actions to correct the problem, and integrate them into the Forest Planning process for funding and execution. The NEPA process will be followed in the planning and implementation of reclamation measures. The Forest Service should work toward inclusion of the more important abandoned mined lands in State inventories and reclamation plans, since both the State and the Office of Surface Mining (OSM) can provide funding for State projects.

REFERENCES. FSM 2522, 6740, 7442, 7443, and 7460; Abandoned Mine Lands Reclamation Control Handbook, Office of Surface Mining; Surface Environment and Mining (SEAM) Reclamation User Guides.

APPENDIX E

GEOCHEMICAL CHARACTERIZATION OF ORE BODY

E. GEOCHEMICAL CHARACTERIZATION OF ORE BODY

BULK ORE AND ORE COMPOSITE CHARACTERIZATION

Kensington gold deposit occurs within a structurally sheared portion of the regionally metamorphosed Jualin Diorite stock. It has features typical of many mesothermal gold-quartz deposits, including a simple deposit mineralogy, an apparent absence of chemical zonation, a low sulfide content, and low abundances of most metals. Mineralization occurs within a north-trending, east-dipping zone of discontinuous, en echelon veins and vein swarms. A study identified seven stages of vein development, four of which produced precious metals mineralization with associated deposition of quartz and carbonate minerals (Coeur, 1996b).

Gold occurs predominantly as calaverite ($AuTe_2$) and less commonly as native gold, both of which are associated with pyrite (FeS_2) (Coeur, 1996b). In addition, rare grains of petzite (Ag_3AuTe_2) have been identified, along with coloradoite (HgTe) and altaite (PbTe). Chalcopyrite ($CuFeS_2$) occurs in minor quantities in association with rare bornite (Cu_5FeS_4), molybdenite (MoS_2), sphalerite (ZnS), galena (PbS), pyrrhotite (FeS), and pentlandite ($(Fe, Ni)_9S_8$). Gangue minerals include quartz (SiO_2), calcite ($CaCO_3$), ankerite ($CaFe(CO_3)_2$), dolomite ($CaMg(CO_3)_2$), gypsum ($CaSO_4 \bullet 2H_2O$), mafic-silicate minerals (chlorite, epidote), and sericite. Secondary minerals identified in the altered diorite stock include biotite, feldspars (albite, orthoclase), oxides (magnetite, rutile), and sphene, in addition to the gangue minerals listed above.

Ore testing has included acid-base accounting, trace metals analysis, kinetic leach testing, and synthetic leach testing. Analytical samples were excavated in bulk from the deposit and obtained from drill cores; a blended ore composite sample used in pilot-scale bench testing of the present ore-processing method was synthesized from drill cuttings and mined samples.

Static Acid-Base Accounting Tests

Geochemica and Kensington Venture (1994) reported the total sulfur content, sulfide sulfur content, and the ratio of neutralizing potential to maximum potential acidity for 581 drill core samples collected from 39 boreholes; partial data are reported for 10 additional samples collected from these boreholes. For each borehole intercept, length-weighted total sulfur contents and ratios of neutralizing potential to maximum potential acidity were computed from the individual sample data. Most boreholes were drilled through the mineralized zone, roughly perpendicular to the orientation of ore body. Individual samples of NQ-diameter core (approximately 1.9 inch) had lengths of 2 to 5 feet.

Samples for sulfur analyses and acid-base accounting (ABA) tests were crushed to minus 80 mesh and analyzed following EPA protocols (PB-280-495) by Lakefield Research; certificates of analysis and sample locations are included in Geochemica and Kensington Venture (1994). Total sulfur contents were determined using a Leco furnace; sulfide sulfur was determined by weak acid leach-Leco; minimum detection limits are not stated for these analyses. Neutralizing

potentials were determined by reacting the sample with hydrochloric acid and back titrating the excess acid. Values for maximum potential acidity were computed from the total sulfur content. Results are reported as tons of $CaCO_3$ equivalent per kiloton of material.

Table E-1 summarizes ABA data for individual drill core samples, and Table E-2 summarized data for length-weighted drill core intercepts. The mean NP/MPA ratio of 3.32 computed for individual samples indicates that the ore samples are net neutralizing; however, there is considerable variability in the sample population, which is skewed toward higher values (the median ratio is 6.28). The histograms shown in Figure E-1 illustrate the distribution of NP/MPA ratios through the sample population. Only 8.1 percent of the samples have NP/MPA ratios less than 1, while an additional 21.8 percent have ratios between 1 and 3. In contrast, 39.1 percent of the samples have NP/MPA ratios greater than 10. Length-weighted intercept ratios are markedly more consistent (range of 1.18 to 25.04). Thirteen intercepts had a weighted ratio less than 3 (see Table E-2), whereas 12 of the 39 weighted borehole intercepts had ratios greater than 5 (median value of 3.86.

Kensington Venture (1992) conducted ABA tests on a sample of bulk ore excavated from the Kensington deposit (location and sample description were not provided). The sample has a neutralization potential of 132.9 tons equivalent per kiloton, an acid generation potential (AGP) of 16.4 tons equivalent per kiloton, and a computed NP/AGP ratio of 8.1.

Trace Metals and Bulk Compositional Analysis

Compositional analyses were performed on whole-rock samples obtained from drill core and cuttings and subsurface excavation. Samples were analyzed by Lakefield Research, Ltd. (Toronto, Canada), Barringer Laboratories, Inc. (Reno, Nevada), and N.A. Degerstrom (Spokane, Washington) using a variety of analytical techniques. This section summarizes data collected on bulk ore samples, metallurgical samples, and composite drill core intercepts.

Six bulk ore samples, ranging in size from 1.5 to 252 tons, were excavated from the Kensington deposit or synthesized from previously mined material and drill cuttings. The locations of bulk samples collected from the 2,050-foot adit, 800-foot adit, and Crosscut 2 are given in Kensington Venture (1994). The 252-ton sample from the 800-foot adit was excavated from the heart of the deposit; descriptions of the other samples were not provided. The composite bulk sample M1 was formulated in 1994 from material excavated from Crosscut 2 in 1991 (Coeur, 1996b). This 2.7-ton sample was used in ore processing and leaching tests at Degerstrom Labs. The composite sample M2 (also referred to as composite B) was excavated from Crosscut 2 in 1994 (Coeur, 1996b) and shipped to Lakefield Research for use in pilot milling studies. This 3.8-ton bulk sample, recovered from the mid-section of the deposit, contains quartz and carbonate veins and associated pyritic mineralization. In 1996, Montgomery Watson personnel formulated a 1.5-ton sample from previously mined samples collected in 1994 (Montgomery Watson, 1996b). This blended sample was sent to the Degerstrom facility for pilot-scale bench tests of the revised ore-processing method. Table E-3 summarizes trace metals analyses for the bulk ore samples.

Table E-1. Acid-Base Accounting Data for Individual Kensington Ore Samples Collected From Drill Core

	Total Sulfur						Sulfide Sulfur						NP/MPA					
Borehole	Mean	Std Dev	Median	Low	High	n	Mean	Std Dev	Median	Low	High	n	Mean	Std Dev	Median	Low	High	n
K-47A	2.55	2.34	1.61	0.37	6.99	8	2.50	2.29	1.59	0.36	6.80	8	1.11	0.17	1.54	0.32	10.60	8
K-47B	1.83	1.55	1.50	0.40	5.05	7	1.72	1.59	1.20	0.39	5.05	7	1.87	0.22	2.90	0.29	9.65	7
K-48	0.79	1.14	0.45	0.05	6.08	29	0.72	1.14	0.40	0.04	5.96	30	7.21	5.76	11.20	0.58	96.60	29
K-93	1.81	2.06	1.28	0.03	10.40	25	1.66	2.06	1.03	0.02	10.40	25	1.99	0.50	3.16	0.22	111.50	25
K-94	0.99	1.80	0.17	0.03	7.26	19	0.88	1.61	0.15	0.03	6.53	19	3.98	0.82	27.40	0.46	142.60	19
K-96	0.86	1.17	0.44	0.06	4.98	43	0.60	1.07	0.19	0.02	4.85	43	5.32	1.71	10.70	0.05	56.10	43
K-101	1.42	1.49	0.85	0.17	5.32	17	1.29	1.47	0.73	0.15	5.32	17	3.21	1.73	5.26	0.75	24.70	17
K-126	1.46	1.73	1.08	0.14	8.68	24	1.31	1.76	0.90	0.10	8.68	24	2.80	1.49	4.09	0.23	27.00	24
K-132	0.74	0.51	0.54	0.24	1.32	5	0.73	0.51	0.52	0.24	1.32	5	6.27	4.06	5.15	0.57	25.20	5
K-135	2.80	5.05	1.51	0.04	22.00	18	2.63	4.86	1.31	0.03	21.00	18	1.67	0.28	3.94	0.14	131.20	18
K-138A	1.96	1.92	1.35	0.12	6.90	14	1.70	1.65	1.29	0.07	5.72	14	2.33	1.22	3.41	0.47	37.70	14
K-138B	1.67	1.63	0.77	0.15	3.63	7	1.64	1.63	0.77	0.13	3.63	7	2.74	0.69	4.06	1.05	40.30	7
K-145	1.55	2.02	0.76	0.09	11.00	37	1.41	1.82	0.58	0.05	9.81	37	2.51	0.42	5.29	0.53	39.40	37
K-156	1.45	1.72	0.55	0.13	5.83	21	1.44	1.71	0.56	0.13	5.71	21	4.03	1.93	10.50	0.66	35.10	21
K-158A	1.20	0.75	1.13	0.35	2.23	5	1.18	0.77	1.13	0.32	2.23	5	3.37	4.89	3.73	1.37	12.90	5
K-158B	1.16	0.88	1.09	0.29	3.28	17	1.09	0.81	1.03	0.28	3.00	17	4.24	1.95	6.17	0.93	18.90	17
K-170	0.74	1.32	0.11	0.03	2.71	4	0.61	1.06	0.11	0.03	2.19	4	5.30	1.85	45.15	1.48	75.00	4
K-180A	0.77	1.03	0.27	0.01	3.42	18	0.73	0.99	0.23	0.01	3.20	18	3.73	3.50	15.35	0.06	266.80	18
K-180B	2.24	1.42	2.19	0.62	3.96	4	2.22	1.45	2.19	0.55	3.96	4	1.48	0.23	1.57	0.66	5.80	4
K-190	2.39	2.26	2.18	0.24	6.19	6	2.32	2.26	2.06	0.18	6.15	6	1.19	0.17	1.80	0.24	13.40	6
K-193	1.00	1.29	0.75	0.02	4.93	13	0.92	0.94	0.72	0.02	3.54	14	4.57	1.61	6.77	1.44	242.50	13
K-222	0.93	1.72	0.40	0.03	8.55	25	0.79	1.55	0.34	0.03	7.55	25	5.02	3.33	10.40	0.35	149.70	25
K-256	1.37	1.11	1.06	0.06	3.23	6	1.17	0.94	0.88	0.05	2.54	5	2.93	4.94	4.35	1.12	59.40	6
K-267	0.97	1.18	0.26	0.05	3.47	13	0.85	1.07	0.21	0.04	3.37	13	3.82	1.59	16.15	1.02	72.30	12
K-326	1.25	1.41	0.90	0.12	4.79	10	1.22	1.43	0.87	0.08	4.79	10	1.66	0.39	2.87	0.44	21.90	10
K-366A	2.02	3.76	0.81	0.06	18.10	28	1.92	3.75	0.76	0.03	18.10	28	2.35	0.19	6.44	0.06	89.40	28
K-366B	1.49	0.28	1.55	1.18	1.73	3	1.39	0.25	1.41	1.13	1.63	3	4.14	11.59	4.21	3.66	4.40	3
K-386	0.69	0.48	0.59	0.03	1.38	9	0.66	0.46	0.59	0.03	1.38	9	5.76	4.21	5.44	2.11	68.00	9
K-388	0.81	1.34	0.30	0.02	4.61	11	0.78	1.29	0.27	0.02	4.45	11	6.23	3.02	18.70	1.67	208.60	11
K-389	0.80	1.08	0.29	0.04	2.86	7	0.73	1.03	0.28	0.03	2.86	7	8.00	2.47	20.80	2.31	118.50	7
K-394	2.48	4.78	0.13	0.03	9.65	4	2.47	4.79	0.12	0.01	9.65	4	1.68	0.18	48.50	0.43	76.30	4
K-398	1.30	1.59	0.61	0.08	5.23	22	1.21	1.53	0.49	0.05	4.94	22	2.00	0.71	4.73	0.33	40.00	22
K-403	0.71	0.58	0.57	0.03	2.24	22	0.65	0.55	0.51	0.02	1.99	22	5.19	3.07	6.73	0.86	117.40	22
K-404	0.29	0.37	0.19	0.03	1.02	6	0.25	0.33	0.16	0.03	0.91	6	20.61	54.44	38.85	4.37	150.60	6
K-407	0.98	0.95	0.61	0.11	3.27	17	0.94	0.92	0.59	0.09	3.18	17	3.81	1.32	6.40	0.83	48.00	17
K-410	1.89	1.21	1.56	0.22	3.88	13	1.79	1.14	1.50	0.22	3.88	13	3.13	2.49	4.38	1.04	26.50	13
K-414	1.02	1.48	0.45	0.11	4.53	8	0.92	1.36	0.39	0.10	4.14	8	5.60	3.09	15.50	0.77	58.80	8
K-416	0.65	0.94	0.35	0.03	3.86	18	0.59	0.94	0.26	0.02	3.83	18	6.40	8.21	12.70	0.84	150.20	18
K-430	1.20	1.23	1.09	0.05	5.68	19	1.14	1.17	1.09	0.05	5.41	19	3.39	2.80	3.69	0.38	83.80	19
Total	1.30	1.91	0.68	0.01	22.00	582	1.19	1.84	0.59	0.01	21.00	583	3.32	0.67	6.28	0.05	266.80	581

Notes:

Total sulfur and sulfide sulfur given in percent.

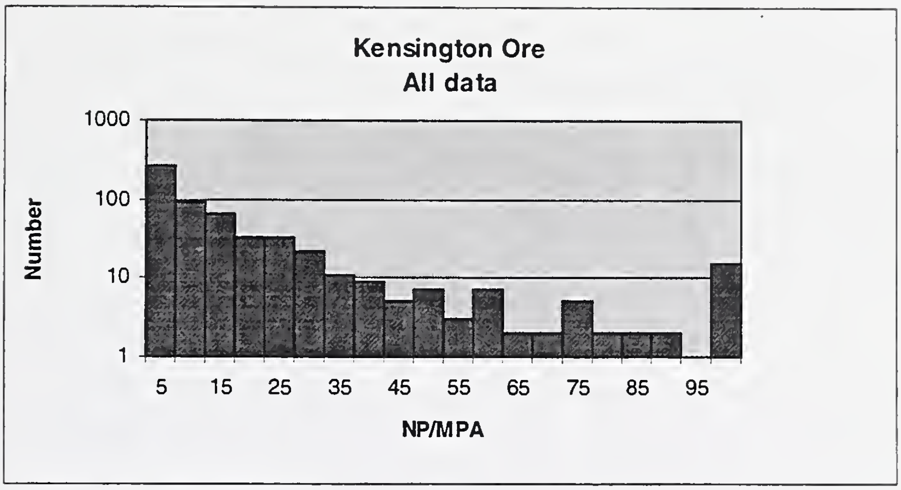
NP/MPA = Neutralization potential/maximum potential acidity. Mean NP/MPA of total population computed from ratio of mean NP and mean MPA values. Standard deviation of mean NP/MPA ratio computed by propagating standard deviations of mean NP and mean MPA values. Low, medium, and high values computed from total population.

Source: Geochemica and Kensington Venture, 1994.

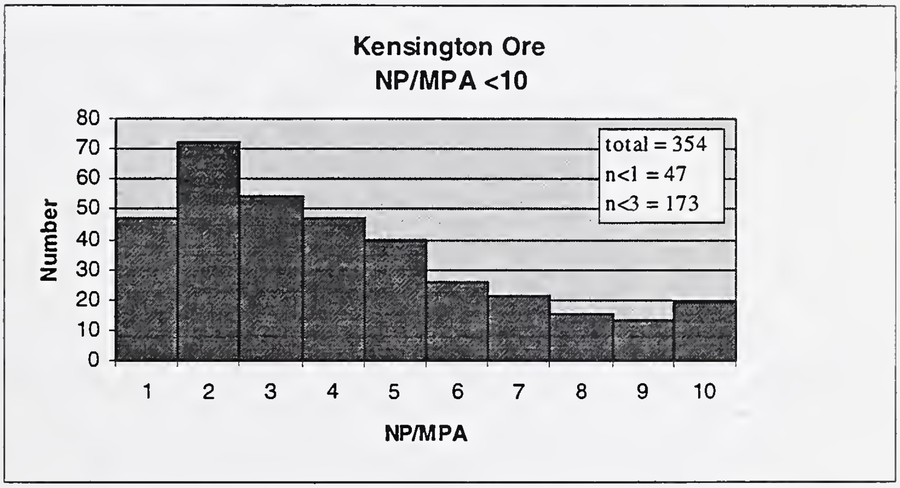
Table E-2. Acid-Base Accounting Data for Length-Weighted Ore Samples Collected From Drill Core

Borehole	Northing	Elev. (ft)	Ore Zone	Drilled		Length Weighted	
				From	To	Total S	NP/MPA
K-47A	70,500N	900	1	72	89	2.42	1.18
K-47B	70,500N	900	2	194	213	1.92	1.77
K-48	71,200N	900	1	182	283	0.71	7.84
K-93	71,000N	600	1	222	306	1.82	1.89
K-94	71,400N	2,200	3	264	347	0.99	3.86
K-96	71,000N	500	1	293	448	0.75	6.21
K-101	71,370N	2,300	3	574	661	1.36	3.29
K-126	71,200N	700	1	210	289	1.46	2.82
K-132	71,500N	1,100	4	240	257	0.79	5.50
K-135	71,200N	500	1	195	258	2.30	2.04
K-138A	71,500N	900	1	84	136	1.35	2.67
K-138B	71,500N	900	4	296	314	1.36	3.69
K-145	71,100N	1,000	1	142	255	1.30	2.90
K-156	71,300N	600	1	278	352	1.29	4.49
K-158A	71,500N	600	4	127	139	1.06	3.90
K-158B	71,500N	600	1	238	296	1.11	4.34
K-170	70,240N	1,100	2	204	218	0.83	4.58
K-180A	70,680N	1,200	1	183	249	0.77	3.80
K-180B	70,680N	1,200	2	289	303	2.23	1.50
K-190	70,500N	1,200	1	197	213	2.23	1.25
K-193	70,500N	1,400	1	275	313	0.83	5.42
K-222	70,500N	200	1	515	575	0.88	5.34
K-256	70,800N	1,500	1	130	145	1.28	3.21
K-267	71,100N	1,400	1	129	166	0.84	4.25
K-326	70,820N	100	1	1155	1197	1.28	1.59
K-366A	71,450N	1,300	1	183	262	1.81	2.57
K-366B	71,450N	1,300	4	372	380	1.46	4.10
K-386	70,600N	2,000	3	533	559	0.63	6.32
K-388	70,600N	2,400	3	411	448	0.93	5.45
K-389	70,500N	2,000	3	692	713	0.73	7.55
K-394	71,200N	2,200	3	364	374	2.95	1.34
K-398	71,000N	0	1	1078	1142	1.29	1.95
K-403	71,100N	2,200	3	370	429	0.67	5.42
K-404	71,100N	2,300	3	358	375	0.24	25.04
K-407	71,100N	2,400	3	377	448	0.97	3.85
K-410	70,900N	2,100	3	377	422	1.85	3.16
K-414	70,800N	2,200	3	354	386	1.00	5.85
K-416	71,160N	200	1	1043	1114	0.67	6.05
K-430	70,500N	2,300	3	469	527	1.06	3.91
Mean						1.27	3.58
Std. Dev.						0.59	3.15
Median						1.11	3.86
Low						0.24	25.04
High						2.95	1.18

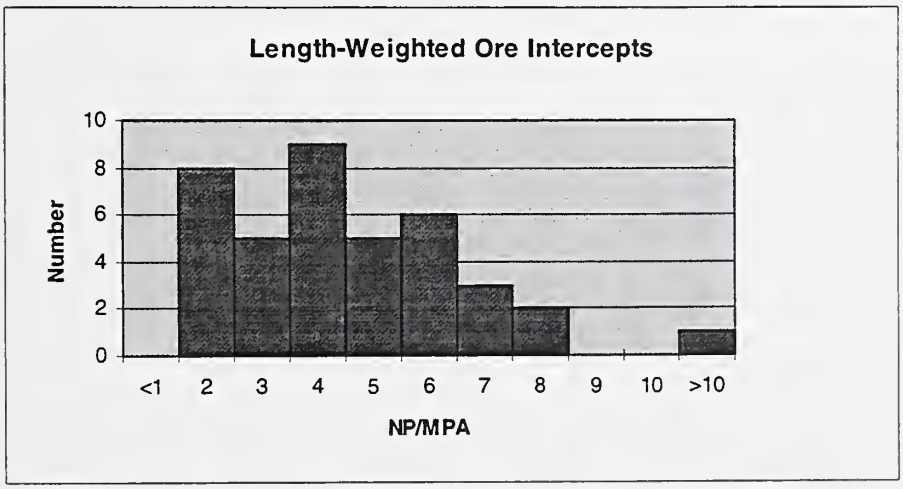
Notes:
Total sulfur given in percent; drilled depths given in feet.
NP/MPA = neutralization potential/maximum potential acidity. Mean NP/MPA computed from mean length-weighted NP and mean length-weighted MPA values. Standard deviation of mean NP/MPA ratio computed by propagating standard deviations of mean length-weighted NP and mean length-weighted MPA values.
Source: Geochemica and Kensington Venture, 1994.



Source: Data from Geochemica and Kensington Venture (1994).



Source: Data from Geochemica and Kensington Venture (1994).



Source: Data recalculated from Geochemica and Kensington Venture (1994).

Figure E-1. Histograms of Acid-Base Accounting Analyses for Kensington Ore Samples

Table E-3. Trace Metals Analyses for Bulk Ore Samples

Sample	2050 Adit	800 Adit	Crosscut 2	M1	Composite B/ M2	Blended Composite
Year	1988	1989	1994	1994	1994	1996
Tons	1.5	252	5	2.7	3.8	1.5
Lab[1]	LR	BL	BL	D	BL/LR	D
Source[2]	SRK	SRK	SRK	C	C	MW
Al			13050	14979	76000	
Sb	0		1	6	<2	2.7
As	0	0	3.7	7	10	9
Ba			87	116	1000	549
Be					<2.0	
Bi			0		<2	4
Cd			0	<1.0	<0.2	<0.1
Ca			25213	24375	32000	29000
Cr			11	13	18	42
Co			26	40	42	28
Cu	950	91	447	390	730	254
Au	0.141*	0.162*	0.198*	0.182	0.183	0.155*
Fe			4.37	7.7	5.3	4.5
La			3		3	
Pb	0		1	120	13	26
Mg			14613	10900	14000	13000
Mn			922	1100	1000	1351
Hg	0.4		0	0.17	<0.3	0.076
Mo	0		9	24	9	13
Ni			5	11	17	7
P			1171	1230	1171	
Se			0	<1.0	<3.0	<1.0
Ag	0	0.2	0.2	0.34	0.2	0.021*
Na			363	120	26000	
S	1.12	1.26		2.37	1.94	1.83
Te	0			5	11	13
Sn						
W			11		11	34
V						55
Y			15		13	
Zn	70		49	73	110	64

Notes:
Analyses expressed in ppm, except Fe and S expressed in percent.
*Analysis expressed in ounces per ton.
1. LR = Lakefield Research, Ltd., Toronto, Ontario, Canada; BL = Barringer Laboratories, Inc., Reno, Nevada; D = N.A. Degerstrom Labs, Spokane, Washington
2. Data sources: SRK = Steffen Robertson and Kirsten, 1996a; C = Coeur, 1996b; MW = Montgomery Watson, 1996b.

Drill core samples were collected from throughout the Kensington deposit for metallurgical testing and trace metals analysis. Barringer Labs in Reno, Nevada, and Lakefield Research, Toronto, Canada, analyzed 770 individual samples collected from 59 boreholes. Length-weighted trace metal contents were computed across the mineralized zone for each borehole intercept. Table E-4 summarizes the analytical methodology and minimum detection limits for each lab. Table E-5 presents the analytical results for the drill core samples.

Kinetic Humidity Cell Leach Testing

Kinetic humidity cell leach tests were performed on duplicate splits of a sample of ore composite B (Lakefield Research, 1995, in SRK 1996a). Testing was conducted for 20 weeks following EPA protocols. Leachate samples were extracted weekly and analyzed for oxidation-reduction potential, conductivity, alkalinity, acidity, and sulfate content. Leachate samples extracted at 4-week intervals were analyzed for trace metals.

As shown in Table E-6, results of the humidity cell tests show that pH, alkalinity, conductivity, and oxidation-reduction potentials are comparatively constant over the duration of the testing; sulfate concentrations are somewhat more variable. Table E-6 also shows that most analyte concentrations remain comparatively constant following the initial flush (week 0).

Meteoric Water Mobility Testing

Kensington Venture (1992) submitted a sample of ore material collected during bulk sampling of the ore body to a Meteoric Water Mobility Test (MWMT). Hibbs Analytical Labs analyzed the extract produced during the test using a variety of EPA procedures. Certificates of analysis and a summation of the procedures used are included in SRK 1996a. Data regarding sample size, location, and manner of collection were not reported. Table E-7 presents the MWMT results.

Toxicity Characteristic Leaching Procedure Test

One sample of ore material collected during bulk sampling of the ore body was subjected to an EPA method 1311 Toxicity Characteristic Leaching Procedure (TCLP) test (Kensington Venture, 1992). Certificates of analysis for the test, which was conducted by Hibbs Analytical Labs, are included in SRK 1996a. Data regarding sample size, location, and manner of collection are not provided. Table E-7 summarizes the results of the TCLP test.

Table E-4. Analytical Methodology and Minimum Detection Limits

Element	Barringer Labs	Lakefield Research	Min. Detection Limit (ppm)	
			Barringer	Lakefield
Al	n.a.	ICP	n.a.	20
Sb	AA	ICP	1	20
As	AA	AA	2	1
Ba	n.a.	ICP	n.a.	5
Be	n.a.	ICP	n.a.	5
Bi	AA	n.a.	1-2	n.a.
Cd	n.a.	ICP	n.a.	5
Ca	n.a.	ICP	n.a.	20
Cr	n.a.	ICP	n.a.	5
Co	n.a.	ICP	n.a.	5
Cu	AA	ICP	1	5
Au	GRAV	n.a.	--	n.a.
Fe	n.a.	ICP	n.a.	5
La	n.a.	ICP	n.a.	20
Pb	AA	AA	1	10
Mg	n.a.	ICP	n.a.	10
Mn	n.a.	ICP	n.a.	5
Hg	HYG	AA	0.01	0.3
Mo	AA	ICP	1	10
Ni	n.a.	ICP	n.a.	5
P	n.a.	ICP	n.a.	5
Se	n.a.	ICP	n.a.	1
Ag	AA	ICP	0.1	20
Na	n.a.	ICP	n.a.	10
S	LECO	LECO	100	100
Te	AA	ICP	2	10
Sn	AA	ICP	10	20
W	COL	n.a.	4	n.a.
Y	n.a.	ICP	n.a.	5
Zn	AA	ICP	1	5

Notes:

AA = atomic absorption spectroscopy; ICP = inductively coupled plasma spectroscopy; LECO = Leco sulfur/carbon analysis; HYG = hydride generation; GRAV = gravimetric fire assay; COL = colormetric; n.a. = not applicable; -- = not stated.

Source: Modified from Kensington Venture, 1994.

Table E-5. Drill Core Sample Analytical Results

Element	Individual Drill Core Samples[1]					Length-Weighted Drill Core Composites[2]							
	Mean	Std Dev	Low	High	n	Mean	Std Dev	Median	Low	High	n	n<MDL	MDL
Al						72288	15619	75809	14352	90178	21		
Sb - BL[3]	1.2	17.5	<1	450	725	<1		<1	<1	9	35	32	1
Sb - LR[3]						<20		<20	4	<20	19	18	20
As	1.6	14.9	<20	388	753	1.5	2	<1	<1	14	59	33	1
Ba	641.1	273.3	<5	3080	213	636.9	198.4	619.8	175.9	1142	21		
Be	<5		<5	<5	211	<5					21	21	5
Bi	<1		<1	1	333	<1					18	18	1
Cd	7.6	6.7	<5	30.2	213	6.8	5.3	3.8	0.5	15.3	21	7	5
Ca						46086	13796	46508	5280	69516	21		
Cr	71	4	<5	554	275	78	106	31	1	374	23		
Co	23	13	<5	97	278	26	9	27	8	43	23		
Cu	205	514	<1	7820	763	210	242	148	19	1406	59		
Au						0.196	0.193	0.135	0.007	1.189	59		
Fe	4.7	1.29	0.49	11.1	210	4.7	1.16	4.67	1.62	8.25	21		
Pb - BL[3]	6.2	63.6	<1	1680	751	2	1.1	2	<1	6	40	3	1
Pb - LR[3]						26.5	53.8	<10	3	240	19	9	10
Mg						13038	3743	13278	2692	21999	21		
Mn	1675	539	159	3921	210	1657	300	1636	1137	2484	21		
Hg	0.18	0.85	<0.01	10.88	696	0.162	0.212	0.088	0.01	1.049	53	4	0.3
La						<20					21	21	20
Mo - BL[3]	6	13	<1	130	483	9.4	9	7.5	1.3	44.2	21		
Mo - LR[3]						<20		<20	0.5	53.1	19	17	20
Ni	49	92.1	<5	406	275	53	86.3	<5	2	277	23	11	5
P						1603	614	1412	332	2601	20		
Se	0.08	0.39	<1	3	211	0.3	0.2	0.4	0	0.6	21	7	1
Ag	0.85	9.51	<0.1	231	634	1.47	6.3	0.22	0	45.4	52	3	0.1
Na						21316	5817	20890	3753	28950	21		
S	1.28	1.93	<0.01	22	707	1.29	0.73	1.09	0.26	2.95	42		
Te - BL[3]						7.55	10.86	4.51	0.11	64.11	39	6	2
Te - LR[3]						6.86	4.26	<10	2.11	14.62	17	4	10
Sn[3]						<20				0	<20	29	26
W						<4			0.1	<4	4	3	4
Y	12.4	4.1	<5	21	213	12.1	2.9	13	4	17	21		
Zn	54.6	76.9	<1	2004	747	58.6	42.5	49.2	8	324	59		

Notes:

1. Data are from Kensington Venture (1994) and Coeur (1996b). All analyses expressed in ppm except sulfur and iron expressed in percent. For values below detection limit, statistics computed using a value of 0.
2. Data are from Coeur (1996b). All analyses expressed in ppm except sulfur and iron expressed in percent. MDL = minimum detection limit. n<MDL = number of data points below minimum detection limit. For values below detection limit, statistics computed using a value of one half the detection limit.
3. BL = Analyses conducted by Barringer Laboratory, Inc., Reno, NV. LR = Analyses conducted by Lakefield Research, Ltd., Toronto, Ontario, Canada.

Table E-6. Humidity Cell Tests

Analyses of Duplicate Samples Measured Weekly for 20 Weeks Plus Initial Flush					
	Mean	Std. Dev.	Median	Low[1]	High[1]
pH	NA	NA	7.77	6.94 (14)	8.93 (18)
emf (mv)	302	59	300	206 (3)	466 (11)
conduct. (μmhos/cm)	148	86	116	53 (10)	386 (1)
SO_4 (mg/l)	42.3	30.3	31.6	12.5 (10)	146.0 (16)
alkalin. [2] (mg/l)	12	4	10	8 (15)	29 (0)

Average of Duplicate Analyses[3]						
week	0	4	8	12	16	20
pH	8.34	8.1	8.02	7.82	7.67	8.5
emf	221	304	336.5	348	337	229
conduct.	313	134	118	162	149	152
SO_4	76.5	43.7	34.7	59.3	122.7	13
alkalin.	27.5	9.5	9.5	11	10.5	10.5
Al	0.06	0.06	0.17	0.04	0.08	0.02
Ba	0.032	0.019	0.017	0.01	0.023	0.008
Ca	37	19	15.2	23.5	38.2	7.9
Cu	0.005	<0.003	0.009	0.005	0.004	<0.003
Mg	6.36	1.58	1.92	2.48	4.27	1.03
Mn	0.28	0.055	0.07	0.047	0.094	0.05
Na	3.96	1.08	1.22	1.59	1.81	0.46
Si	0.33	0.24	0.26	0.31	0.3	0.14
S	34.7	14.7	12.7	17.5	33.5	4.6

Analytes at Concentrations Below Minimum Detection Limits[3]							
	MDL	Max. Value[4]	n > MDL[5]		MDL	Max. Value[4]	n > MDL[5]
Sb	0.02	0.04	3	Mo	0.007	0.064	4
As	0.01	0.07	4	Ni	0.01	0.11	3
Be	0.001	<0.001	0	P	0.03	<0.03	0
Cd	0.002	0.004	3	Se	0.02	0.06	4
Co	0.004	0.02	4	Sn	0.02	0.03	2
Cr	0.004	<0.004	0	Te	0.04	0.04	1
Fe	0.003	0.063	4	Zn	0.004	<0.004	0
Pb	0.02	0.07	4				

Notes:
1. Number in () is week of test in which value was recorded.
2. Alkalinity given in $CaCO_3$ equivalent.
3. All values in mg/l except pH (standard units), alkalinity (mg/l $CaCO_3$ equivalent), emf (mV), conductivity (μmhos/cm).
4. Highest analyzed concentration.
5. Number of analyses exceeding detection limit (12 analyses total). Data are from Lakefield Research (1995) as reported in SRK (1996a).

NA = not applicable.

Table E-7. Meteoric Water Mobility Test and Toxicity Characteristic Leaching Procedure Test Results

	MWMT[1]	TCLP[1]
Sb	0.01	--
As	--	0.007
Ba	--	3.3
Be	<0.010	--
Cd	--	0.048
Ca	35.8	--
Cr	--	<0.10
Co	<0.02	--
Cu	<0.01	--
Fe	0.23	--
Pb	--	0.1
Mg	11.3	--
Mn	<0.05	--
Hg	--	0.0008
Mo	<0.20	--
Ni	<0.02	--
K	49	
Se	--	<0.005
Ag	--	0.015
Na	12.5	--
Sr	15	--
Zn	0.007	--
Alkalinity	77	--
Chloride	3	--
Fluoride	0.34	--
Nitrate-N	5.1	--
Cyanide	0.009	--
Phosphate	<0.05	--
Sulfate	123	--
pH	7.3	--

Notes:

1. All analyses expressed in mg/l, except pH expressed in standard units. Data are from Kensington Venture (1992).
2. Modified EPA method 1312 leach test. All analyses expressed in mg/l. Flotation concentrate produced from blended ore composite sample by Montgomery Watson. Data are from SRK (1996a).

APPENDIX F

SURFACE WATER QUALITY

F. SURFACE WATER QUALITY

SURFACE WATER QUALITY AND MONITORING

A program to characterize the existing surface water quality in the project area was established at the Kensington Mine Project site in 1987. Stations were located to monitor the quality of water discharged as mine drainage and from settling ponds and to determine the baseline water quality in undisturbed portions of the Sherman Creek basin. For purposes of comparison, water quality also was monitored in the adjacent, undisturbed Sweeny Creek basin. Results of the surface water quality monitoring program through October 1995 are presented in Montgomery Watson (1996a); data through June 1996 are presented in Montgomery Watson (1996c). More detailed discussion of the surface water monitoring program is presented in Montgomery Watson (1996a; 1996b) and in the *Technical Resource Document for Water Resources, Kensington Mine Project* (SAIC, 1997a).

Figure F-1 shows and Table F-1 summarizes the locations of the surface water monitoring stations. Note that station 109 replaced station 104 in August 1988. Both are located in upper Sherman Creek, upstream of the access road. The new station, located approximately 100 yards downstream of the old station, was positioned in a reach with a more stable streambed.

Since mid-1988, samples of surface water have been collected monthly at all stations during their period of record, except station 101A, which was sampled on a less regular schedule. Samples were collected by Kensington Joint Venture staff prior to December 1995 and have been collected by Montgomery Labs personnel since that time. Portable equipment was used to

Table F-1. Surface Water Quality Monitoring Stations

Station Number	Location	Period of Record
101	Outfall of existing mine drainage settling ponds	6/88 – present
101A	Outlet of 800-foot adit	9/87 – 6/89
102	South tributary of Ophir Creek, upstream of settling ponds	6/88 – 6/89
103	South tributary of Ophir Creek, downstream of settling ponds	11/87 – present
104	Upper Sherman Creek, upstream of access road	10/87 – 8/88
105	Lower Sherman Creek, below falls	9/87 – present
106	Lower Sweeny Creek	9/87 – 9/94
108	Outlet of 2,050-foot adit	7/88 – 6/93
109*	Upper Sherman Creek, upstream of access road	8/88 – 9/94
110	North tributary of Ophir Creek, upstream settling pond discharge	4/91 – present

*Located 100 meters downstream of station 104.

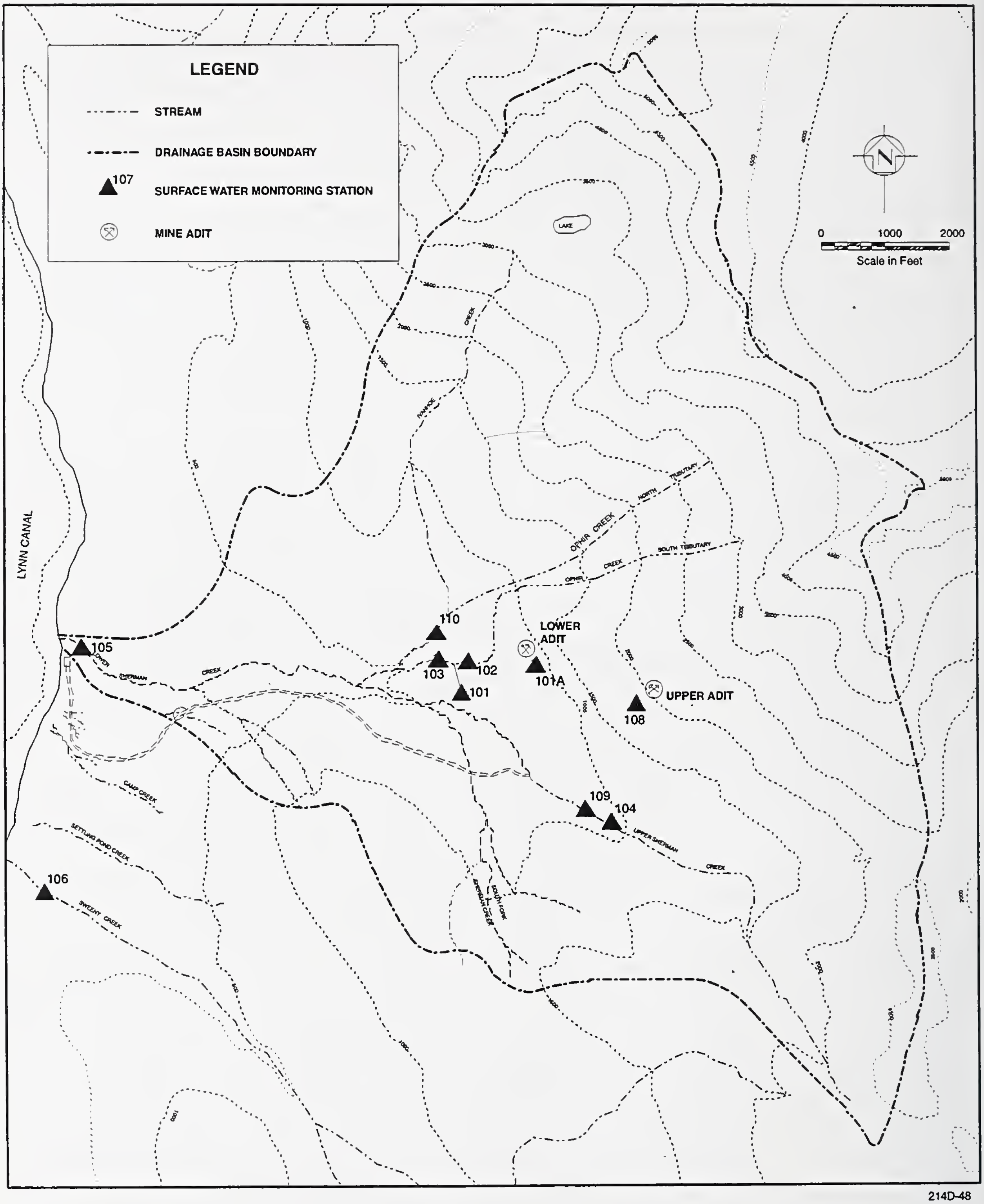


Figure F-1. Sherman Creek Drainage and Surface Water Monitoring Stations (Source: Adapted from Montgomery Watson, 1996a and SRK, 1996d)

measure pH, turbidity, water temperature, and specific conductance in the field. Samples were filtered in the field through elements with 0.45 mm pore diameters to prepare them for analysis of dissolved constituents. From 1987 to 1993, field-cleaned, reusable filters were used to process samples; since 1993, single-use, disposable filters have been used. Whenever possible, stream flow was recorded concurrently with sample collection. Flow rates were measued periodically in the field at stations 101, 103, 106, 109, and 110. A permanent recording gauge installed along lower Sherman Creek (station 105) in October 1989 has provided a continuous record of stream flow for the drainage basin.

Two laboratories have analyzed samples collected for surface water quality. Intermountain Laboratories (IML) in Sheridan, Wyoming, conducted chemical analyses from 1987 to November 1994. Montgomery Laboratories (ML) in Juneau, Alaska, conducted sample analyses from June 1993 to present. From July 1993 through November 1994, ML and IML periodically performed duplicate analyses of surface water samples, which were conducted to assess analytical consistency between the two laboratories. The results were reasonably consistent for the five constituents analyzed (i.e., As, Cu, Pb, Hg, and hardness).

Laboratory work was performed in accordance with 40 CFR Part 136, *Guidelines Establishing Test Procedures for the Analysis of Pollutants* and EPA *Methods for Chemical Analysis of Water and Wastes*. As a check on analytical accuracy, both labs routinely performed analyses of blanks and synthesized standards of known composition; sample analyses were corrected accordingly as required by EPA quality assurance/quality control procedures. Table F-2 summarizes the analytical methods and reporting limits of both labs. Note that analytical methods have improved with time, showing a general trend toward lower reporting limits.

The water quality monitoring effort focused primarily on trace metals, which typically occur in concentrations at or near their method detection limits. Nitric and hydrochloric acid digestion of samples was used for analyses of total recoverable metals. Raw analytical data show that dissolved metals concentrations are occasionally reported at levels higher than total metals concentrations. This is particularly true of samples collected during 1993. Montgomery Watson (1996a) discusses this apparent inconsistency, which could result from sample contamination, inappropriate analytical procedures, or overlapping analytical tolerances. While some inconsistent analyses are likely due to overlapping analytical tolerances at concentrations near the method detection limits, the switch from reusable to disposable filters in 1993 corresponded to the near elimination of inconsistent analyses.

Table F-3 summarizes sample analyses conducted through October 1995 for each surface water monitoring station and presents analyses from stations 104 and 109 combined as station 109. Analytical data were screened and evaluated prior to their inclusion in the table. Duplicate analyses were evaluated using a protocol that gave priority to detected values with the lowest reporting limit. Analyses with inconsistent values between dissolved and total metals were screened using maximum tolerance limits. Fifty-two analyses, representing less than 0.001 percent of the raw data, with values outside of their computed tolerance limits were removed from the data base. Ten surface water temperature measurements recorded as zero values between the months of April and October were considered implausible and removed from the data base; zero values recorded in the winter months were not removed.

Table F-2. Laboratory Methods, Reporting Limits, and Reporting Periods

Parameter	Intermountain Laboratories			Montgomery Laboratories		
	Analysis Method	Analysis Period	Reporting Limit	Analysis Method	Analysis Period	Reporting Limit
Aluminum (µg/L)	EPA 200.7	06/88-11/94	100	EPA 202.1	07/93-11/95	500
Arsenic (µg/L)	EPA 206.2	09/87-11/94	5	EPA 200.9	07/93-09/93	5
	---	---	---	EPA 206.2	10/93-10/95	0.5
Barium (µg/L)	EPA 200.7	06/88-11/94	500	EPA 208.1	07/93-10/95	500
Cadmium (µg/L)	EPA 213.2	09/87	0.5	EPA 200.9	07/93-09/94	1
	EPA 213.2	10/87-09/91	2	EPA 213.2	10/94-10/95	0.2
	EPA 213.2	10/91-11-94	0.5	---	---	---
Chromium (µg/L)	EPA 200.7	09/87	1	EPA 218.1	07/93-02/95	50
	EPA 200.7	10/87-06/89	5	EPA 218.1	03/95-10/95	20
	EPA 200.7	10/87-09/91	20	---	---	---
	EPA 200.7	10/91-11/94	10	---	---	---
Copper (µg/L)	EPA 200.7	09/87-06/89	2	EPA 200.9	07/93-09/94	20
	EPA 200.7	06/88-09/91	10	EPA 220.1	10/94-10/95	2
	EPA 200.7	10/91-11/94	5	---	---	---
Iron (µg/L)	EPA 200.7	09/87-11/88	10	EPA 236.1	07/93-02/95	100
	EPA 200.7	12/88-11/94	50	EPA 236.1	03/95-10/95	50
Lead (µg/L)	EPA 239.2	09/87	2	EPA 200.9 &	07/93-10/95	2
	EPA 239.2	10/87-11/88	10	239.2	---	---
	EPA 239.2	12/88-09/91	20	---	---	---
	EPA 239.2	10/91-11/94	1	---	---	---
Manganese (µg/L)	EPA 200.7	07/87-06/89	2	EPA 243.1	07/93-02/95	20
	EPA 200.7	06/88-11/94	20	EPA 243.1	03/95-10/95	15
Mercury (µg/L)	EPA 245.1	09/87-09/91	1	EPA 245.2	07/93-09/94	2
	EPA 245.1	11/91-11/94	0.1	EPA 245.2	10/94-10/95	0.2
Molybdenum (µg/L)	EPA 200.7	12/88-11/94	20	EPA 246.1	07/93-10/95	500
Nickel (µg/L)	EPA 200.7	09/87	2	EPA 200.9	07/93-02/95	20
	EPA 200.7	10/87-11/94	10	EPA 249.2	03/95-10/95	10
Selenium (µg/L)	EPA 270.2	09/87	2	EPA 200.9 &	07/93-10/95	5
	EPA 270.2	10/87-11/94	5	270.2	---	---
Silver (µg/L)	EPA 200.7	09/87	1	EPA 200.9	07/93-09/94	50
	EPA 200.7	10/87-11/87	2	EPA 272.1	10/94-10/95	0.5
	EPA 200.7	12/88-09/91	10	---	---	---
	EPA 200.7	10/91-11/94	0.1	---	---	---
Zinc (µg/L)	EPA 200.7	09/87-06/89	2	EPA 289.1	07/93-02/95	20
	EPA 200.7	06/88-11/94	10	EPA 289.1	03/95-10/95	10
Cyanide, free (µg/L)	EPA 335.3	12/89-10/90	5	No Analysis		
Cyanide, WAD (µg/L)	EPA 335.3	12/89-10/90	5	No Analysis		
Cyanide, total (µg/L)	EPA 335.3	12/89-10/90	5	No Analysis		
Ortho-Phosphate (µg/L)	EPA 365.1	09/87-06/89	5	EPA 365.1	07/93-10/95	50
	EPA 365.1	09/88-11/94	10	---	---	---

Table F-2. Laboratory Methods, Reporting Limits, and Reporting Periods (continued)

Parameter	Intermountain Laboratories			Montgomery Laboratories		
	Analysis Method	Analysis Period	Reporting Limit	Analysis Method	Analysis Period	Reporting Limit
Nitrite-Nitrogen (µg/L)	EPA 354.1	09/87-06/89	5	EPA 354.1	07/93-03/94	100
	EPA 354.1	06/88-11/94	10	EPA 300.0	04/94-09/95	200
	---	---	---	EPA 300.0	10/95	100
Nitrate-Nitrogen (µg/L)	EPA 353.1	09/87-06/89	200	EPA 353.2,3	07/93-03/94	100
	EPA 353.1	06/88-11/94	10	EPA 353.2,3	04/94-09/95	200
	---	---	---	EPA 353.2,3	10/95	100
Nitrite+Nitrate	EPA 353.2	06/88-11/94	10	ML/EPA 353.2	07/93-08/94	300
Nitrogen (µg/L)	---	---	---	EPA 300.0	09/94-09/95	400
	---	---	---	EPA 353.2	10/95	200
Ammonium	EPA 350.1	09/87-01/89	50	ML/EPA 350.1	07/93-09/95	50
Nitrogen (µg/L)	EPA 350.1	06/88-11/93	10	---	---	---
	EPA 350.1	01/94-11/94	50	---	---	---
Boron (mg/L)	EPA 200.7	06/88-11/94	0.01	ML 6010, 200.7	07/93-10/93	0.05
	---	---	---	EPA 212.3	11/93-10/95	0.05
Sodium (mg/L)	SM 325B	12/88-11/94	0.2	EPA 273.1	07/93-10/95	1.0
Potassium (mg/L)	SM 322B	05/89	0.1	EPA 258.1	07/93-10/95	1.0
	SM 322B	09/88-05/94	0.2	---	---	---
Calcium (mg/L)	EPA 215.2	08/88-11/94	1.0	EPA 215.1	07/93-11/93	1.0
	---	---	---	EPA 215.1	12/93-10/95	1.0 to 2.0
Magnesium (mg/L)	SM 318C	09/88-11/94	1.0	EPA 242.1	07/93-10/95	1.0
Fluoride (mg/L)	EPA 340.2	09/88-11/94	0.2	SM 4500-FC	07/93-10/95	0.1
Chloride (mg/L)	EPA 325.3	12/89-11/94	1.0	EPA 325.3	07/93-03/94	1.0
	---	---	---	EPA 300.0	04/94-09/95	2.0
	---	---	---	EPA 300.0	10/95	1.0
Sulfate (mg/L)	EPA 375.3	09/87-11/94	1.0	EPA 300.0	07/93-11/93	2.0
	---	---	---	EPA 300.0	12/93-09/95	4.0
	---	---	---	EPA 300.0	10/95	2.0
Hydroxide (mg/L)	EPA 310.1	10/90-11/94	1.0	EPA 310.1	07/93-10/95	0.001
Carbonate (mg/L)	EPA 310.1	12/88-11/94	1.0	EPA 310.1	07/93-10/95	0.001
Bicarbonate (mg/L)	EPA 310.1	12/88-11/94	1.0	EPA 310.1	07/93-10/95	0.001
Total Alkalinity (mg/L)	EPA 310.1	12/88-11/94	1.0	EPA 310.1	07/93-10/95	2.0
Acidity (mg/L)	EPA 305.1	12/88-11/94	1.0	EPA 305.1	07/93-12/94	2.0
	---	---	---	EPA 305.1	01/95-10/95	10
Hardness (mg/L)	EPA 130.2	12/88-11/94	1.0	ML/SM 2340B	07/93-10/95	1.0
pH (s.u.)	EPA 150.1	09/87-11/94	0.1	EPA 150.1	07/93-10/95	0.001
TDS (mg/L)	EPA 160.1	06/88-11/94	1.0	ML/EPA 160.1	07/93-08/94	10
	---	---	---	ML/EPA 160.1	09/94-10/95	20
Conductivity (µmhos/cm)	EPA 120.1	09/87-11/94	10	EPA 120.1	07/93-10/95	4.0
TSS (mg/L)	EPA 160.2	09/88-11/94	1.0	EPA 160.2	07/93-10/95	4.0
Turbidity (NTU)	EPA 180.1	08/88-11/94	0.05	EPA 180.1	07/93-10/95	0.05
Sett. Solids (m/L)	EPA 160.5	12/88-11/94	0.1	EPA 160.5	07/93-10/95	0.1
SAR (units)	Calculated	12/88-11/94	NA	Calculated	07/93-05/94	0.0000
	---	---	---	Calculated	06/94-10/95	0.0001

Table F-3. Summary of Surface Water Data from the Sherman Creek Drainage, August 1997 – October 1995

Station		Flow (cfs)	Field pH (units)	Field Cond (µmhos/cm)	Field Turb (NTU)	Temp (°C)	Al (µg/L) Tot.	Al (µg/L) Diss.	As (µg/L) Tot.	As (µg/L) Diss.	Ba (µg/L) Tot.	Ba (µg/L) Diss.
Station 101	Mean	0.85	7.8	542	11	7.1	168	NA	1.9	1.8	NA	NA
	Min	0.16	7.2	33	0.1	1.9	100	<100	0.7	1.1	<500	<500
	Max	1.71	8.58	1,206	65	15	1,500	<500	5.6	8	<500	<500
	Detects	58	71	56	60	57	24	5	19	18	0	0
	Non-detects	0	0	0	0	0	50	76	55	71	74	81
Station 101A	Mean	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Min	NA	NA	NA	NA	NA	NA	NA	NA	1	NA	NA
	Max	NA	NA	NA	NA	NA	NA	NA	NA	<5	NA	NA
	Detects	0	0	0	0	0	0	0	0	1	0	0
	Non-detects	0	0	0	0	0	0	0	0	4	0	0
Station 102	Mean	NA	7.1	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Min	NA	7.0	NA	NA	NA	NA	<100	NA	<5	NA	<500
	Max	NA	7.2	NA	NA	NA	NA	<100	NA	<5	NA	<500
	Detects	0	4	0	0	0	0	0	0	0	0	0
	Non-detects	0	0	0	0	0	0	1	0	6	0	1
Station 103	Mean	4.2	7.3	271	3.2	5.0	56	NA	1.8	1.0	NA	NA
	Min	0.17	6.73	1	0.11	0.4	100	<100	0.59	0.5	<500	<500
	Max	32.8	8.16	758	46	11.5	600	<500	50	18	<500	<500
	Detects	53	69	53	57	56	12	1	11	11	0	0
	Non-detects	0	0	0	0	0	58	77	60	82	71	78
Station 105	Mean	28	7.4	93	1.6	4.5	51	NA	0.47	0.49	NA	NA
	Min	0.58	6.40	16	0.18	0.1	100	<100	0.55	0.51	<500	<500
	Max	105	8.60	310	14.1	12	1,000	<500	0.81	1	<500	<500
	Detects	52	67	56	58	57	11	4	6	8	0	0
	Non-detects	0	0	0	0	0	58	73	64	84	70	77
Station 106	Mean	18	7.4	79	2.7	5.0	96	69	NA	NA	NA	NA
	Min	0.98	6.23	16	0.29	0	100	100	<0.5	<0.5	<500	<500
	Max	67	8.44	168	26	15	1,100	300	5	6	<500	<500
	Detects	46	61	48	51	48	22	17	5	4	0	0
	Non-detects	0	0	0	0	0	38	51	55	78	60	68
Station 108	Mean	NA	7.4	51	3.3	5.3	198	NA	NA	NA	NA	NA
	Min	0.45	6.8	40	0.45	3.5	100	<100	<5	<5	<500	<500
	Max	0.54	7.70	61	7.35	6.6	800	100	<5	<5	<500	<500
	Detects	2	13	9	9	10	8	3	0	0	0	0
	Non-detects	0	0	0	0	0	3	9	11	17	11	12
Station 109	Mean	8.8	7.4	62	1.4	4.1	35	NA	1.2	1.1	NA	NA
	Min	1.14	6.18	25	0.17	0.2	100	<10	0.5	0.5	<500	<500
	Max	32.7	8.55	121	7.3	10.9	300	<500	2.8	3.2	<500	<500
	Detects	46	55	44	47	44	7	6	13	12	0	0
	Non-detects	0	0	0	0	0	53	62	47	66	60	68
Station 110	Mean	8.1	7.1	45	0.5	4.6	NA	NA	NA	NA	NA	NA
	Min	0.25	6.45	20	0.10	1.5	<100	<100	<0.5	<0.5	<500	<500
	Max	26.8	7.76	390	1.79	10	<500	<500	<5	<5	<500	<500
	Detects	45	46	46	47	46	4	2	1	1	0	0
	Non-detects	0	0	0	0	0	49	51	53	53	54	53

Table F-3. Summary of Surface Water Data from the Sherman Creek Drainage, August 1997 – October 1995 (continued)

Station		Cd (µg/L)		Cr (µg/L)		Cu (µg/L)		Fe (µg/L)		Pb (µg/L)		Mn (µg/L)		Hg (µg/L)	
		Tot.	Diss.	Tot.	Diss.	Tot.	Diss.	Tot.	Diss.	Tot.	Diss.	Tot.	Diss.	Tot.	Diss.
Station 101	Mean	NA	NA	NA	NA	9.0	3.4	278	NA	1.3	NA	43	27	NA	NA
	Min	*<0.2*	*<0.2*	*<10*	*<5*	2.7	4	50	*<10*	1	*<1*	20	20	*<0.05*	*<0.05*
	Max	*<2*	*<2*	*<50*	*<50*	150	30	1,570	800	20	*20*	800	560	*<1*	*<1*
	Detects	0	0	0	0	21	14	46	8	17	6	44	41	0	0
	Non-detects	74	88	74	84	53	72	28	81	57	80	30	47	74	88
Station 101A	Mean	NA	NA	NA	NA	NA	5.1	NA	282	NA	NA	NA	NA	NA	NA
	Min	NA	*<0.5*	NA	*<1*	NA	5	NA	20	NA	*<2*	NA	*<2*	NA	*<1*
	Max	NA	*<2*	NA	*<5*	NA	6	NA	1,200	NA	*<10*	NA	*<2*	NA	*<1*
	Detects	0	0	0	0	0	4	0	4	0	0	0	0	0	0
	Non-detects	0	5	0	5	0	1	0	1	0	5	0	5	0	5
Station 102	Mean	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Min	NA	*<2*	NA	*<5*	NA	*<2*	NA	*<10*	NA	*<10*	NA	*<2*	NA	*<1*
	Max	NA	*<2*	NA	*<20*	NA	35	NA	*120*	NA	*<20*	NA	*<20*	NA	*<1*
	Detects	0	0	0	0	0	1	0	1	0	0	0	1	0	0
	Non-detects	0	6	0	3	0	5	0	5	0	6	0	5	0	6
Station 103	Mean	NA	NA	NA	NA	4.1	2.2	90	25	4.4	NA	23	15	NA	NA
	Min	*<0.2*	*<0.2*	*<10*	*<5*	2.1	3	50	10	1	*<1*	19	3	*<0.05*	*<0.05*
	Max	*<2*	*2*	*<50*	*<50*	50	10	730	160	217	*62*	220	220	*<1*	*<2*
	Detects	1	1	0	0	15	9	40	19	17	3	31	30	0	0
	Non-detects	70	90	71	88	56	84	31	74	54	88	40	62	71	92
Station 105	Mean	NA	NA	NA	NA	3.1	2.2	72	40	1.1	NA	NA	NA	NA	NA
	Min	*<0.2*	*<0.2*	*<10*	*<1*	2.3	2	50	20	1	*<1*	<15	*<2*	*<0.05*	*<0.05*
	Max	*<2*	*<2*	*<50*	*<50*	30	25	2,070	210	36	*<20*	360	*195*	*<1*	*<2*
	Detects	0	0	1	1	13	14	32	23	12	5	2	7	0	0
	Non-detects	70	91	69	87	57	76	37	69	58	85	68	84	70	91
Station 106	Mean	NA	NA	NA	NA	5.3	2.3	131	83	5.4	NA	NA	11	NA	NA
	Min	*<0.5*	*<0.5*	*<10*	*<1*	5	2	50	20	1	*<1*	*<20*	2	*<0.05*	*<0.05*
	Max	*<2*	*<5*	*<50*	*<50*	25	10	2,070	470	256	*<20*	*150*	470	*<1*	*<1*
	Detects	2	0	0	0	14	9	43	49	15	3	5	9	0	0
	Non-detects	58	82	60	82	46	71	17	33	45	76	55	73	60	82
Station 108	Mean	NA	NA	NA	NA	6.4	5.2	242	27	0.74	NA	NA	NA	NA	NA
	Min	*<0.5*	*<0.5*	*<10*	*<5*	5	6	50	70	1	*<1*	*<20*	*<2*	*<0.1*	*<0.1*
	Max	*3.4*	*<2*	*<10*	*<20*	19	11	1,090	240	4	*<20*	*30*	*30*	*<0.1*	*<1*
	Detects	1	0	0	1	7	6	9	3	3	1	2	2	0	0
	Non-detects	10	17	11	13	4	11	2	14	8	16	9	15	11	17
Station 109	Mean	NA	NA	NA	NA	4.3	2.4	61	48	0.76	NA	NA	NA	NA	NA
	Min	*<0.5*	*<0.5*	*<10*	*<2*	5	3	50	10	1	*<1*	*<10*	*<2*	*<0.05*	*<0.05*
	Max	*<2*	*2*	*<50*	*<50*	30	43	700	1,100	3	*<20*	*170*	*430*	*<1*	*<2*
	Detects	1	1	0	0	11	8	29	14	13	6	3	5	0	0
	Non-detects	59	77	60	77	49	68	31	63	47	69	57	73	60	78
Station 110	Mean	NA	NA	NA	NA	4.3	NA	45	NA	3.9	NA	NA	NA	NA	NA
	Min	*<0.2*	*<0.2*	<10	<10	2	*<2*	50	*<50*	1	*<1*	*<15*	*<15*	*<0.05*	*<0.05*
	Max	*<2*	*<2*	<50	<50	41	*<20*	480	*<100*	186.5	*57*	*40*	*<20*	*<1*	*<1*
	Detects	1	0	0	0	13	2	14	0	10	3	2	0	0	0
	Non-detects	53	53	54	53	41	51	40	54	44	50	52	53	54	53

Table F-3. Summary of Surface Water Data from the Sherman Creek Drainage, August 1997 – October 1995 (continued)

Station		Mo (µ/g/L)		Ni (µ/g/L)		Se (µ/g/L)		Ag (µ/g/L)		Zn (µ/g/L)		Cn (free)	CN (WAD)	CN (total)	PO_4-P	NO_2N	NO_3N
		Tot.	Diss.	Tot.	Diss.	Tot.	Diss.	Tot.	Diss.	Tot.	Diss.	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
Station 101	Mean	53	47	NA	NA	NA	NA	0.12	NA	11	8.9	NA	8.1	16	15	113	2,775
	Min	30	20	<10	<10	<5	<5	0.1	<0.1	10	5	<5	8	12	10	20	10
	Max	90	90	<20	<20	<5	<5	1	<50	60	50	50	51	78	300	1,400	39,100
	Detects	60	62	1	3	0	0	17	6	30	29	2	3	5	33	23	78
	Non-detects	13	19	73	86	74	88	57	81	44	56	9	8	6	53	65	10
Station 101A	Mean	NA	NA	NA	NA	NA	NA	NA	NA	NA	3.6	NA	NA	NA	NA	NA	NA
	Min	NA	NA	NA	<2	NA	<2	NA	<1	NA	3	NA	NA	NA	<5	<5	<200
	Max	NA	NA	NA	<10	NA	<5	NA	<2	NA	8	NA	NA	NA	7	<5	200
	Detects	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	1
	Non-detects	0	0	0	5	0	5	0	5	0	2	0	0	0	4	5	4
Station 102	Mean	NA	NA	NA	NA	NA	NA	NA	NA	NA	7.1	NA	NA	NA	NA	NA	637
	Min	NA	<20	NA	<10	NA	<5	NA	<10	NA	6	NA	NA	NA	<5	<5	10
	Max	NA	<20	NA	<10	NA	<5	NA	<20	NA	12	NA	NA	NA	10	<10	2,510
	Detects	0	0	0	0	0	0	0	0	0	4	0	0	0	2	0	6
	Non-detects	0	1	0	6	0	6	0	6	0	2	0	0	0	3	6	0
Station 103	Mean	20	18	NA	NA	NA	NA	0.17	0.06	12	9.9	NA	NA	10	8.7	49	3,169
	Min	20	20	<10	<10	<5	<5	0.1	0.1	10	5	<5	<5	7	5	8	90
	Max	60	50	<20	<20	<5	<5	1.1	0.9	60	58	<5	8	86	110	1,610	36,000
	Detects	24	23	3	2	0	0	14	6	30	36	0	1	3	29	24	84
	Non-detects	46	55	68	91	71	92	57	86	41	57	12	11	9	62	68	8
Station 105	Mean	NA	NA	NA	NA	NA	NA	0.09	NA	7.7	7.2	NA	NA	NA	7.7	3.8	774
	Min	<20	<20	<10	<2	<5	<2	0.1	<0.1	10	3	<5	<5	<5	10	7	10
	Max	<500	<500	<20	20	<5	<5	1.1	<50	50	40	<5	<5	<5	130	60	19,200
	Detects	0	0	2	1	0	0	10	5	19	28	0	0	0	24	8	81
	Non-detects	69	74	68	91	70	91	60	86	51	62	10	11	10	65	83	10
Station 106	Mean	NA	NA	NA	NA	NA	NA	0.13	NA	7.5	7.5	NA	NA	NA	8.6	NA	419
	Min	<20	<20	<10	<2	<5	<2	0.1	<0.1	10	3	<5	<5	<5	8	<5	15
	Max	<500	<500	<20	<20	<5	<5	1.1	<50	40	40	<5	<5	<5	120	<100	14,200
	Detects	0	0	5	5	0	0	12	6	17	25	0	0	0	29	1	71
	Non-detects	60	68	56	76	60	82	48	76	43	54	11	11	11	51	81	11
Station 108	Mean	NA	NA	NA	NA	NA	NA	0.19	NA	8.3	6.9	NA	NA	NA	15	NA	122
	Min	<20	<20	<10	<10	<5	<5	0.1	<0.1	10	3	NA	NA	NA	10	<5	10
	Max	<20	<20	<10	<10	<5	<5	0.7	<10	20	20	NA	NA	NA	190	10	310
	Detects	0	0	0	0	0	0	7	2	5	6	0	0	0	3	1	16
	Non-detects	11	12	11	17	11	17	4	15	6	11	0	0	0	12	16	1
Station 109	Mean	NA	NA	NA	NA	NA	NA	0.11	NA	7.0	8.0	NA	NA	NA	9.4	NA	459
	Min	<20	<20	<10	<10	<5	<5	0.1	<0.1	10	3	<5	<5	<5	10	<5	10
	Max	<500	<500	20	<20	<5	<5	1.3	<50	30	54	<5	<5	<5	200	<100	15,500
	Detects	0	1	4	3	0	0	10	3	16	18	0	0	0	23	3	77
	Non-detects	60	67	56	75	60	78	50	75	44	57	11	11	12	55	75	1
Station 110	Mean	NA	NA	NA	NA	NA	NA	0.10	NA	10	5.4	NA	NA	NA	6.7	NA	214
	Min	<20	<20	<10	<10	<5	<5	0.1	<0.1	10	10	NA	NA	NA	10	<10	30
	Max	<500	<500	<20	<20	<5	<5	1.7	<50	150	20	NA	NA	NA	130	<200	535
	Detects	0	0	1	1	0	0	9	4	14	6	0	0	0	9	0	45
	Non-detects	53	53	53	53	54	53	45	49	40	47	0	0	0	44	53	8

Table F-3. Summary of Surface Water Data from the Sherman Creek Drainage, August 1997 – October 1995 (continued)

Station		NO_3+NO_2-N (µg/L)	NH_4-N (µg/L)	pH (s.u.)	TDS (mg/L)	Cond (µmhos/cm)	TSS (mg/L)	Turbidity (NTU)	Sett. Solids (ml/L)	SAR (units)	B (mg/L)
Station 101	Mean	3,061	1,793	--	539	735	12	6.7	NA	0.48	0.16
	Min	10	10	6.8	70	124	1	0.08	*<0.1*	0.26	0.01
	Max	96,000	22,600	8.3	1,268	1,523	140	48	*<1*	0.82	0.35
	Detects	64	60	89	86	89	63	88	2	81	77
	Non-detects	10	24	0	0	0	24	0	81	0	4
Station 101A	Mean	NA	NA	--	93	128	NA	NA	NA	NA	NA
	Min	NA	*<10*	6.7	74	120	NA	NA	NA	NA	NA
	Max	NA	*<50*	7.6	140	150	NA	NA	NA	NA	NA
	Detects	0	0	5	5	5	0	0	0	0	0
	Non-detects	0	5	0	0	0	0	0	0	0	0
Station 102	Mean	NA	NA	--	28	44	NA	0.46	NA	NA	NA
	Min	*2.5*	*<10*	7.0	22	33	*0*	0.1	*<0.1*	0.02	*<0.01*
	Max	*2.5*	*57*	7.6	41	51	*13*	1.8	*<0.1*	0.02	*<0.01*
	Detects	1	1	6	4	6	2	4	0	1	0
	Non-detects	0	5	0	0	0	0	2	1	0	1
Station 103	Mean	2,922	718	--	243	343	3.6	1.2	NA	0.31	0.08
	Min	90	20	5.7	31	51	1	0.1	*<0.1*	0.06	0.01
	Max	36,000	9,590	8.0	996	1,310	33	14	*<0.5*	0.71	0.31
	Detects	59	59	93	90	93	50	85	0	77	61
	Non-detects	11	29	0	0	0	34	2	79	0	17
Station 105	Mean	498	54	--	71	112	4.2	1.1	NA	0.17	0.05
	Min	10	6	6.0	22	37	1	0.05	*<0.1*	0.0001	0.01
	Max	4,360	350	8.0	194	287	120	26	*<0.5*	0.40	0.15
	Detects	57	50	92	88	92	47	83	0	77	51
	Non-detects	13	37	0	2	0	36	2	78	0	25
Station 106	Mean	154	65	--	65	102	4.6	1.9	NA	0.24	0.05
	Min	15	10	6.3	20	30	1	0.05	*<0.1*	0.025	0.01
	Max	1,000	1,120	8.1	130	200	85	19	*<0.5*	0.48	0.16
	Detects	54	45	82	79	82	47	74	0	67	38
	Non-detects	5	37	0	0	0	25	1	67	0	29
Station 108	Mean	106	39	--	57	110	5.7	1.9	NA	0.07	0.06
	Min	10	40	7.0	26	76	1	0.1	*<0.1*	0.03	0.02
	Max	310	120	7.9	102	167	28	11	*<0.1*	0.20	0.15
	Detects	11	6	17	14	17	12	14	0	12	8
	Non-detects	0	11	0	0	0	3	3	12	0	4
Station 109	Mean	2,608	60	--	54	89	3.4	1.7	NA	0.11	0.05
	Min	20	10	5.7	16	31	1	0.1	*<0.1*	0.02	0.01
	Max	111,750	1,380	7.85	110	185	73	50	*<0.1*	0.86	0.23
	Detects	58	36	78	78	78	52	71	0	68	45
	Non-detects	1	42	0	0	0	19	2	68	0	23
Station 110	Mean	239	55	--	31	53	1.7	0.60	NA	0.08	0.05
	Min	30	20	6.7	8	37	1	0.05	*<0.1*	0.02	0.01
	Max	700	670	7.7	80	86	8	20	*<0.5*	0.17	0.13
	Detects	44	24	54	48	54	24	51	0	39	33
	Non-detects	8	25	0	6	0	30	3	54	13	20

Table F-3. Summary of Surface Water Data from the Sherman Creek Drainage, August 1997 – October 1995 (continued)

Station		Na (mg/L)	K (mg/L)	Ca (mg/L)	Mg (mg/L)	F (mg/L)	Cl (mg/L)	SO_4 (mg/L)	OH (mg/L)	CO_3 (mg/L)	HCO_3 (mg/L as HCO_3)	Tot Alk (mg/L as $CaCO_3$)	Acidity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)
Station 101	Mean	21	1.3	125	8.3	0.19	8.4	291	0.02	0.85	101	83	NA	349
	Min	6.8	0.2	11	0.5	0.03	3	3.6	0.021	0.25	36.4	30	*<1*	47
	Max	47.5	8.6	277	54	0.36	22	714	0.08	1.35	125	102	*<10*	734
	Detects	82	74	88	88	85	82	84	27	27	82	88	0	84
	Non-detects	0	13	0	0	3	0	0	0	0	0	0	82	0
Station 101A	Mean	NA	NA	NA	NA	NA	NA	18	NA	NA	NA	NA	NA	NA
	Min	NA	*<0.1*	*19*	*2.9*	*<0.2*	NA	14	NA	NA	NA	*48*	NA	NA
	Max	NA	*<0.1*	*19*	*2.9*	*<0.2*	NA	29	NA	NA	NA	*48*	NA	NA
	Detects	0	0	1	1	0	0	5	0	0	0	1	0	0
	Non-detects	0	1	0	0	1	0	0	0	0	0	0	0	0
Station 102	Mean	NA	0.46	20	0.88	NA	NA	2.7	NA	NA	NA	18	NA	NA
	Min	*0.2*	0.2	4.2	0.5	*0.01*	*1.1*	2	NA	0	*23*	13	*<1*	*26*
	Max	*0.2*	1.0	89	1.5	*<0.2*	*1.1*	5	NA	0	*23*	22	*<1*	*26*
	Detects	1	3	6	6	2	1	6	0	0	1	6	0	1
	Non-detects	0	2	0	0	4	0	0	0	0	0	0	1	0
Station 103	Mean	9.7	0.91	56	4.9	0.10	4.9	117	0.01	0.23	51	41	NA	169
	Min	1	0.1	7	0.1	0.01	0.8	3	0	0	16	10	*<1*	32
	Max	34	6.2	204	44	0.67	18	507	0.017	0.6	118	97	*<10*	591
	Detects	81	61	86	86	68	78	91	18	18	79	86	0	81
	Non-detects	6	25	1	1	19	1	0	0	0	0	0	79	0
Station 105	Mean	2.8	0.27	17	1.8	0.02	3.0	20	0.01	0.13	36	29	NA	50
	Min	0.5	0.1	3.3	0.2	0.01	0.5	3	0	0	21	14	*<1*	21
	Max	9.4	1.5	43	8.6	0.07	12	77	0.017	0.25	55	45	*<10*	117
	Detects	77	42	85	80	57	77	80	19	19	78	84	0	80
	Non-detects	1	43	0	5	28	1	1	0	0	0	0	78	0
Station 106	Mean	3.6	0.29	15	1.7	0.03	5.3	3.5	0.01	0.29	51	40	NA	45
	Min	0.6	0.16	3	0.2	0.01	0.6	0.8	0	0	15	9	*<1*	18
	Max	8.1	0.9	33	5.1	0.08	18	10	0.021	0.59	105	86	<2	91
	Detects	67	47	75	69	60	67	77	6	6	67	75	0	69
	Non-detects	0	27	0	6	15	0	2	0	0	0	0	67	0
Station 108	Mean	1.2	0.17	15	2.5	0.04	0.74	10	NA	NA	50	42	NA	48
	Min	0.4	0.2	11	1.05	0.01	0.3	3.3	*0*	*0*	45	37	*<1*	39
	Max	3.9	0.5	22	4.5	0.3	1.7	31	*0*	*0*	59	50	*<1*	73
	Detects	12	7	17	17	13	10	17	0	0	12	17	0	13
	Non-detects	0	9	0	0	4	2	0	0	0	0	0	12	0
Station 109	Mean	1.7	0.25	13	1.6	0.02	1.9	7.2	0.015	0.19	41	34	NA	41
	Min	0.4	0.1	2.3	0.3	0.01	0.25	2.5	0.007	0.06	24	12	*<1*	24
	Max	12	0.9	21	9	0.07	10.55	14	0.05	0.50	68.2	56	<2	58
	Detects	68	39	72	70	64	66	78	14	16	68	72	0	70
	Non-detects	0	31	0	1	8	2	0	0	0	0	0	68	0
Station 110	Mean	0.96	0.15	8.0	0.81	0.01	1.3	2.5	0.01	0.07	25	21	NA	23
	Min	0.2	0.2	4.7	0.1	0.01	0.2	1.2	0.005	0.04	18	15	*<1*	14
	Max	2	2.2	12.8	3.4	0.07	4.3	5.85	0.009	0.11	40.5	33	*<10*	39.5
	Detects	39	12	54	36	27	46	45	18	18	54	54	0	54
	Non-detects	15	42	0	18	27	8	9	0	0	0	0	54	0

Notes:

- Minimum and maximum detected values are shown for sets with sufficient data for robust statistical analysis. Italics indicate overall minimum and maximum values (considering non-detects) for sets with insufficient data for robust statistical analysis.
- NA – "No Data Available for Analysis" indicates no analyses conducted for constituent.
- All metals are total recoverable.
- Source: Montgomery Watson, 1996a.

The data presented in Table F-3 were analyzed using a statistical method that uses a distribution/substitution technique developed for analyzing data with a large number of non-detect values and multiple detection limits. EPA Region 10 and ADEC accepted the method, which was developed by Helsel and Cohn (1988) and Helsel (1990), for implementation on the Kensington Gold Project. The technique assumes a log-normal distribution of analytical values to compute percentile distributions.

APPENDIX G

GROUND WATER QUALITY

G. GROUND WATER QUALITY

GROUND WATER QUALITY AND MONITORING

A program to characterize the existing ground water quality in the project area was established at the Kensington mine site in 1989. Wells were installed throughout the Sherman Creek basin and the Terrace Area basin to sample ground waters. Results of the ground water monitoring program through October 1995 are presented in Montgomery Watson (1996c); data through June 1996 are presented in Montgomery Watson (1996b). Ground water quality data collected from the Terrace Area drainage basin (proposed dry tailings facility [DTF] site) are provided in SRK, 1996e. More detailed discussion of the ground water monitoring program can be found in Montgomery Watson (1996a; 1996c) and in the *Technical Resource Document for Water Resources, Kensington Mine Project* (SAIC, 1997a).

The locations of the ground water monitoring wells installed in the Sherman Creek drainage basin are shown in Figure G-1 and their characteristics are summarized in Table G-1. Most wells were sampled on a monthly or quarterly basis during their period of record, which ranges from 16 months (SH-8) to 7 years (SH-3).

The locations of the ground water monitoring wells installed in the Terrace Area drainage basin are shown on Figure G-2 and their characteristics are summarized in Table G-1. Three additional wells (i.e., MW 96-6A, MW 96-8A, MW 96-9) were completed in the Terrace Area, but water quality data have not been reported for these wells. The wells in the Terrace Area drainage were sampled once during the summer of 1996.

Ground water samples were collected by Kensington Joint Venture staff prior to December 1995 and have been collected by Montgomery Labs personnel since that time. Portable equipment was used to measure pH, turbidity, water temperature, and specific conductance in the field. Samples were filtered in the field through elements with pore diameters of 0.45 mm to prepare them for analysis of dissolved constituents. From 1987 to 1993, field-cleaned, reusable filters were used to process samples; since 1993, single-use, disposable filters have been used. Piezometers were installed in the Sherman Creek drainage boreholes to permit monitoring of ground water levels and quality. Table G-1 borehole depths and sampling intervals. It should be noted that four wells in the Sherman Creek basin (i.e., SH-7, SH-8, SH-10, and SH-11A) were contaminated by grout during installation.

Two laboratories have analyzed samples collected for ground water quality. Intermountain Laboratories (IML) in Sheridan, Wyoming, conducted chemical analyses from 1987 to November 1994. Montgomery Laboratories (ML) in Juneau, Alaska, conducted sample analyses from June 1993 to present. Duplicate ground water samples were not analyzed in the two labs during their period of overlap. However, a program to assess inter-lab consistency, conducted as part of the surface water quality monitoring program, produced reasonably consistent results for the five constituents (i.e., As, Cu, Pb, Hg, and hardness) analyzed by both labs.

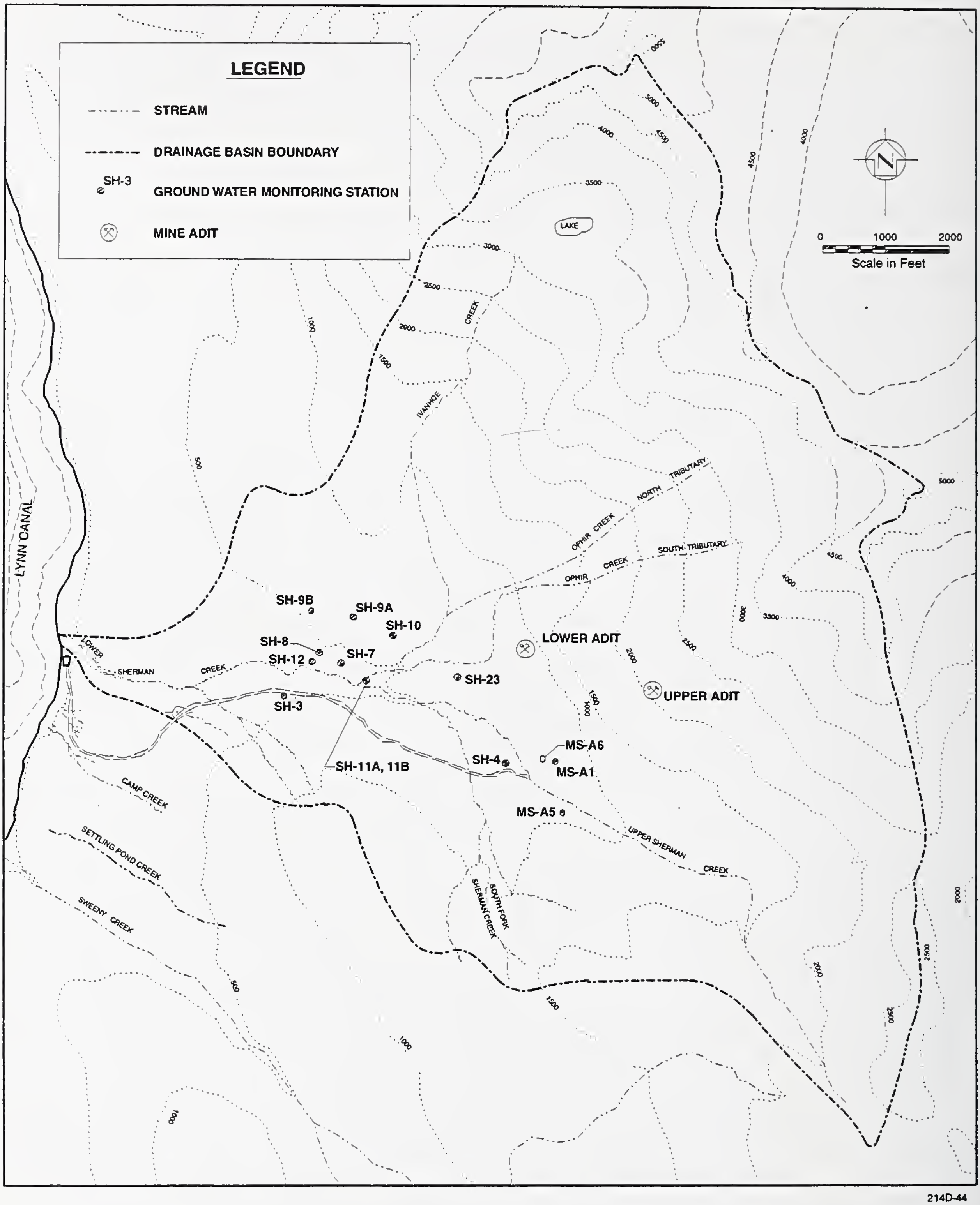


Figure G-1. Ground Water Monitoring Wells in Sherman Creek Drainage Basin (Source: Adapted from Montgomery Watson, 1996a and SRK, 1996d)

Table G-1. Ground Water Quality Monitoring Stations

Well Number	Installation Date	Boring Depth[1]	Perforated Interval[1]	Mean-Static Water Depth[1]	Medium of Perforated Interval
			Sherman Creek Drainage Basin[2]		
SH-3	11/6/88	101.5	60-90	54.0	sandy gravelly clay
SH-4	11/7/88	26.0	9.5-24.5	18.0	gravelly sand
SH-7	10/22/89	78.1	44.2-54.2	38.0	phyllite/meta-siltstone
SH-8	8/16/89	110.4	85-95	39.2	clay; phyllite
SH-9A	9/9/89	31.2	21-31	2.2	clayey sand; silty gravel
SH-9B	11/26/89	178.6	134.5-164.5	36.3	clay; clayey sand
SH-10	9/7/89	102.0	67-87	6.2	silty sand; silty gravel
SH-11A	10/30/89	76.3	39.6-46.6	5.6	phyllite
SH-11B	10/31/89	32.0	19-29	6.9	silty sand
SH-12	10/25/89	55.0	21.5-31.5	2.8	phyllite with clay gouge
SH-23	12/15/89	88.5	43-63	n.r.	clay
MS-A1	11/28/90	32.0	16.5-26.5	16.3	silty sand; clay till
MS-A5	11/20/90	40.0	28-38	2.2	clay till
MS-A6	11/29/90	22.5	12.5-22.5	0.0	diorite
			Terrace Area Drainage Basin[3]		
MW 96-1	6/2/96	65.0	42.7-62.7	13.8	slate/phyllite
MW 96-1A	6/3/96	7.1	1.8-6.8	2.0	clayey sand; slate
MW 96-2	6/4/96	63.8	53.5-63.5	13.6	slate
MW 96-2A	6/3/96	7.1	1.8-6.8	2.6	silty sand; slate
MW 96-3	5/31/96	78.4	66.4-76.4	5.4	slate/phyllite
MW 96-3A	5/31/96	7.0	1.5-6.5	3.6	clayey sand; phyllite
MW 96-4	6/14/96	28.2	22.5-27.5	2.6	slate
MW 96-4A	6/14/96	8.0	1.1-6.0	0.9	peat; silty sand; slate
MW 96-5	6/13/96	44.7	37.0-42.0	11.6	phyllite
MW 96-5A	6/13/96	8.5	3.0-8.0	2.2	slate/phyllite
MW 96-6	6/12/96	15.3	9.8-14.8	2.6	slate
MW 96-7	6/11/96	39.0	22.7-37.7	1.8	slate/phyllite
MW 96-7A	6/10/96	9.6	4.2-9.2	1.7	silty sand/gravel; slate
MW 96-8	6/9/96	33.8	n.r.	n.r.	clayey sand/gravel
MW 96-9A	6/7/96	7.3	2.0-7.0	1.2	silty sand/gravel; slate
MW 96-10	6/6/96	44.1	27.2-42.2	2.3	slate
MW 96-10A	6/5/96	8.5	1.1-6.1	1.3	peat; silty sand

1. Depths given in feet; mean static water table as feet below top of casing.
   n.r. = not reported.
2. Data are from Montgomery Watson, 1996a.
3. Source: SRK, 1996f. Perforated interval is interval of slotted pvc.

Laboratory work was performed in accordance with 40 CFR Part 136, *Guidelines Establishing Test Procedures for the Analysis of Pollutants* and EPA *Methods for Chemical Analysis of Water and Wastes*. As a check on analytical accuracy, both labs routinely performed analyses of blanks and synthesized standards of known composition; sample analyses were corrected accordingly as required by EPA quality assurance/quality control procedures. Table G-2 lists the analytical methods and reporting limits of both labs. Note that analytical methods have improved with time, showing a general trend toward lower reporting limits.

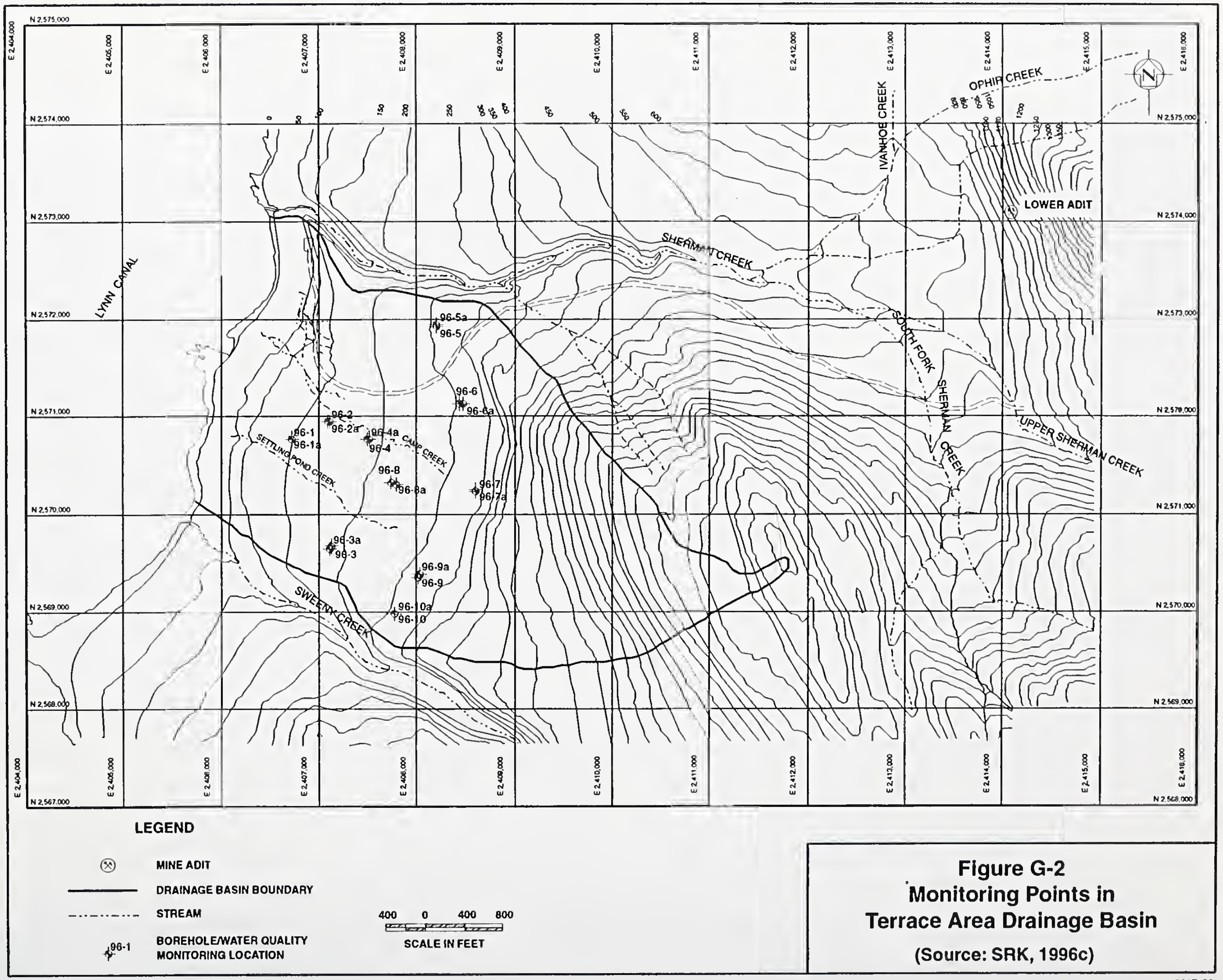


Figure G-2
Monitoring Points in Terrace Area Drainage Basin
(Source: SRK, 1996c)

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Table G-2. Laboratory Methods, Reporting Limits, and Reporting Periods

Parameter	Intermountain Laboratories			Montgomery Laboratories		
	Analysis Method	Analysis Period	Reporting Limit	Analysis Method	Analysis Period	Reporting Limit
Aluminum (µg/L)	EPA 200.7	06/88-11/94	100	EPA 202.1	07/93-11/95	500
Arsenic (µg/L)	EPA 206.2	09/87-11/94	5	EPA 200.9	07/93-09/93	5
	---	---	---	EPA 206.2	10/93-10/95	0.5
Barium (µg/L)	EPA 200.7	06/88-11/94	500	EPA 208.1	07/93-10/95	500
Cadmium (µg/L)	EPA 213.2	09/87	0.5	EPA 200.9	07/93-09/94	1
	EPA 213.2	10/87-09/91	2	EPA 213.2	10/94-10/95	0.2
	EPA 213.2	10/91-11-94	0.5	---	---	---
Chromium (µg/L)	EPA 200.7	09/87	1	EPA 218.1	07/93-02/95	50
	EPA 200.7	10/87-06/89	5	EPA 218.1	03/95-10/95	20
	EPA 200.7	10/87-09/91	20	---	---	---
	EPA 200.7	10/91-11/94	10	---	---	---
Copper (µg/L)	EPA 200.7	09/87-06/89	2	EPA 200.9	07/93-09/94	20
	EPA 200.7	06/88-09/91	10	EPA 220.1	10/94-10/95	2
	EPA 200.7	10/91-11/94	5	---	---	---
Iron (µg/L)	EPA 200.7	09/87-11/88	10	EPA 236.1	07/93-02/95	100
	EPA 200.7	12/88-11/94	50	EPA 236.1	02/95-10/95	50
Lead (µg/L)	EPA 239.2	09/87	2	EPA 200.9 &	07/93-10/95	2
	EPA 239.2	10/87-11/88	10	239.2	---	---
	EPA 239.2	12/88-09/91	20	---	---	---
	EPA 239.2	10/91-11/94	1	---	---	---
Manganese (µg/L)	EPA 200.7	07/87-06/89	2	EPA 243.1	07/93-02/95	20
	EPA 200.7	06/88-11/94	20	EPA 243.1	03/95-10/95	15
Mercury (µg/L)	EPA 245.1	09/87-09/91	1	EPA 245.2	07/93-09/94	2
	EPA 245.1	11/91-11/94	0.1	EPA 245.2	10/94-10/95	0.2
Molybdenum (µg/L)	EPA 200.7	12/88-11/94	20	EPA 246.1	07/93-10/95	500
Nickel (µg/L)	EPA 200.7	09/87	2	EPA 200.9	07/93-02/95	20
	EPA 200.7	10/87-11/94	10	EPA 249.2	03/95-10/95	10
Selenium (µg/L)	EPA 270.2	09/87	2	EPA 200.9 &	07/93-10/95	5
	EPA 270.2	10/87-11/94	5	270.2	---	---
Silver (µg/L)	EPA 200.7	09/87	1	EPA 200.9	07/93-09/94	50
	EPA 200.7	10/87-11/87	2	EPA 272.1	10/94-10/95	0.5
	EPA 200.7	12/88-09/91	10	---	---	---
	EPA 200.7	10/91-11/94	0.1	---	---	---
Zinc (µg/L)	EPA 200.7	09/87-06/89	2	EPA 289.1	07/93-02/95	20
	EPA 200.7	06/88-11/94	10	EPA 289.1	03/95-10/95	10
Cyanide, free (µg/L)	EPA 335.3	12/89-10/90	5		No Analysis	
Cyanide, WAD (µg/L)	EPA 335.3	12/89-10/90	5		No Analysis	
Cyanide, total (µg/L)	EPA 335.3	12/89-10/90	5		No Analysis	
Ortho-Phosphate (µg/L)	EPA 365.1	09/87-06/89	5	EPA 365.1	07/93-10/95	50
	EPA 365.1	09/88-11/94	10	---	---	---
Nitrite-Nitrogen (µg/L)	EPA 354.1	09/87-06/89	5	EPA 354.1	07/93-03/94	100
	EPA 354.1	06/88-11/94	10	EPA 300.0	04/94-09/95	200
	---	---	---	EPA 300.0	10/95	100

Table G-2. Laboratory Methods, Reporting Limits, and Reporting Periods (continued)

Parameter	Intermountain Laboratories			Montgomery Laboratories		
	Analysis Method	Analysis Period	Reporting Limit	Analysis Method	Analysis Period	Reporting Limit
Nitrate-Nitrogen (µg/L)	EPA 353.1	09/87-06/89	200	EPA 353.2,3	07/93-03/94	100
	EPA 353.1	06/88-11/94	10	EPA 353.2,3	04/94-09/95	200
	---	---	---	EPA 353.2,3	10/95	100
Nitrite+Nitrate Nitrogen (µg/L)	EPA 353.2	06/88-11/94	10	ML/EPA 353.2	07/93-08/94	300
	---	---	---	EPA 300.0	09/94-09/95	400
	---	---	---	EPA 353.2	10/95	200
Ammonium Nitrogen (µg/L)	EPA 350.1	09/87-01/89	50	ML/EPA 350.1	07/93-09/95	50
	EPA 350.1	06/88-11/93	10	---	---	---
	EPA 350.1	01/94-11/94	50	---	---	---
Boron (mg/L)	EPA 200.7	06/88-11/94	0.01	ML 6010, 200.7	07/93-10/93	0.05
	---	---	---	EPA 212.3	11/93-10/95	0.05
Sodium (mg/L)	SM 325B	12/88-11/94	0.2	EPA 273.1	07/93-10/95	1.0
Potassium (mg/L)	SM 322B	05/89	0.1	EPA 258.1	07/93-10/95	1.0
	SM 322B	09/88-05/94	0.2	---	---	---
Calcium (mg/L)	EPA 215.2	08/88-11/94	1.0	EPA 215.1	07/93-11/93	1.0
	---	---	---	EPA 215.1	12/93-10/95	1.0 to 2.0
Magnesium (mg/L)	SM 318C	09/88-11/94	1.0	EPA 242.1	07/93-10/95	1.0
Fluoride (mg/L)	EPA 340.2	09/88-11/94	0.2	SM 4500-FC	07/93-10/95	0.1
Chloride (mg/L)	EPA 325.3	12/89-11/94	1.0	EPA 325.3	07/93-03/94	1.0
	---	---	---	EPA 300.0	04/94-09/95	2.0
	---	---	---	EPA 300.0	10/95	1.0
Sulfate (mg/L)	EPA 375.3	09/87-11/94	1.0	EPA 300.0	07/93-11/93	2.0
	---	---	---	EPA 300.0	12/93-09/95	4.0
	---	---	---	EPA 300.0	10/95	2.0
Hydroxide (mg/L)	EPA 310.1	10/90-11/94	1.0	EPA 310.1	07/93-10/95	0.001
Carbonate (mg/L)	EPA 310.1	12/88-11/94	1.0	EPA 310.1	07/93-10/95	0.001
Bicarbonate (mg/L)	EPA 310.1	12/88-11/94	1.0	EPA 310.1	07/93-10/95	0.001
Total Alkalinity (mg/L)	EPA 310.1	12/88-11/94	1.0	EPA 310.1	07/93-10/95	2.0
Acidity (mg/L)	EPA 305.1	12/88-11/94	1.0	EPA 305.1	07/93-12/94	2.0
	---	---	---	EPA 305.1	01/95-10/95	10
Hardness (mg/L)	EPA 130.2	12/88-11/94	1.0	ML/SM 2340B	07/93-10/95	1.0
pH (s.u.)	EPA 150.1	09/87-11/94	0.1	EPA 150.1	07/93-10/95	0.001
TDS (mg/L)	EPA 160.1	06/88-11/94	1.0	ML/EPA 160.1	07/93-08/94	10
	---	---	---	ML/EPA 160.1	09/94-10/95	20
Conductivity (µmhos/cm)	EPA 120.1	09/87-11/94	10.0	EPA 120.1	07/93-10/95	4.0
TSS (mg/L)	EPA 160.2	09/88-11/94	1.0	EPA 160.2	07/93-10/95	4.0
Turbidity (NTU)	EPA 180.1	08/88-11/94	0.05	EPA 180.1	07/93-10/95	0.05
Sett. Solids (ml/L)	EPA 160.5	12/88-11/94	0.1	EPA 160.5	07/93-10/95	0.1
SAR (units)	Calculated	12/88-11/94	NA	Calculated	07/93-05/94	0.0000
	---	---	---	Calculated	06/94-10/95	0.0001

The water quality monitoring effort focused primarily on trace metals, which typically occur in concentrations at or near their method detection limits. Nitric and hydrochloric acid digestion of samples was used for analyses of total recoverable metals. Raw analytical data show that dissolved metals concentrations are occasionally reported at levels higher than total metals concentrations. This is particularly true of samples collected during 1993. Montgomery Watson (1996a) discusses this apparent inconsistency, which could result from sample contamination, inappropriate analytical procedures, or overlapping analytical tolerances. While some inconsistent analyses are likely due to overlapping analytical tolerances at concentrations near the method detection limits, the switch from reusable to disposable filters in 1993 corresponded to the near elimination of inconsistent analyses.

Table G-3 summarizes sample analyses conducted through October 1995 for each ground water monitoring station in the Sherman Creek basin. Analytical data were screened and evaluated prior to their inclusion into Table G-3. Duplicate analyses were evaluated using a protocol that gave priority to detected values with the lowest reporting limit. Analyses with inconsistent values between dissolved and total metals were screened using maximum tolerance limits. Thirteen analyses with values outside of their computed tolerance limits were removed from the data base. Seven hundred and eighty-one outlier data points were identified in the Sherman Creek ground water quality data base by computing two standard deviations around the mean value of each constituent. Four of these data points were identified as erroneous and removed from the data base. They included total arsenic analyses of samples collected from stations SH-3 and SH-7 on 9/15/94, which were prepared improperly for analysis; a spurious TDS analysis of a sample collected from station SH-11B on 6/21/94 caused by matrix interference from abnormally high TSS; and a TDS analysis of a sample collected from station SH-11B on 10/9/95 that was contaminated when particles broke through a lab filter. Several values recorded as zero were also eliminated from the data base. These included 25 ground water temperature measurements and zero values recorded for hydroxide, bicarbonate, carbonate and alkalinity at station SH-23 on 2/18/91.

The data presented in Table G-3 were analyzed using a statistical method that utilizes a distribution/substitution technique developed for data with a large number of non-detect values and multiple detection limits. EPA Region 10 and ADEC accepted the method, which was developed by Helsel and Cohn (1988) and Helsel (1990), for implementation on the Kensington Mine Project. The technique assumes a log-normal distribution of analytical values to compute percentile distributions.

Table G-4 presents ground water analyses of samples collected from the Terrace Area drainage basin. The summarized values include analyses of a single sample collected from each of the 17 monitoring wells shown in Table G-1. These data were not analyzed using the robust statistical methods applied to the Sherman Creek drainage data. Instead, non-detected values were included in the statistical computations by using a value of one-half of the method detection limit (MDL); for constituents with variable detection limits (e.g., total Al), a value of one-half of the lowest detection limit (e.g., 0.25 for total Al) was used. Because the data in Tables G-3 and G-4 received different statistical treatment, readers should exercise caution when comparing summarized data from the Sherman Creek and Terrace Area drainages.

Table G-3. Summary of Ground Water Data from the Sherman Creek Drainage

Station		Depth to Water (feet)	Field pH (units)	Field Cond (µmhos/cm)	Field Turb (NTU)	Water Temp (°C)
Station SH-3	**Mean**	54	--	238	NA	5.1
	Min	50.6	7.28	125	*33*	0
8/89-pres.	**Max**	56.13	8.54	293	*72*	7.6
m/q	**Detects**	21	21	21	2	19
	Non-detects	0	0	0	0	0
Station SH-4	**Mean**	18	--	65	NA	5.6
	Min	14.93	5.13	20	*96*	0
11/89-pres.	**Max**	20.21	7.35	195	*96*	11.7
m/q	**Detects**	20	19	20	1	17
	Non-detects	0	0	0	0	0
Station SH-7	**Mean**	38	--	6,190	NA	5.8
	Min	30.95	8.5	1,590	NA	3.1
11/89-9/94	**Max**	40.88	12.93	8,980	NA	8.5
irr.	**Detects**	5	5	5	0	5
	Non-detects	0	0	0	0	0
Station SH-8	**Mean**	39	--	4,221	NA	5.6
	Min	26.51	8.5	468	NA	3
3/90-6/91	**Max**	49.54	12.96	8,720	NA	12
m	**Detects**	12	12	12	0	10
	Non-detects	0	0	0	0	0
Station SH-9A	**Mean**	2.2	--	174	NA	6.3
	Min	0.1	6.26	105	*6.6*	3.4
11/89-9/94	**Max**	4.54	8.25	310	*80*	9.2
m/q	**Detects**	8	15	16	2	14
	Non-detects	0	0	0	0	0
Station SH-9B	**Mean**	NA	--	214	NA	6.5
	Min	*36.3*	7.27	10	*0.55*	3.7
4/90-9/94	**Max**	*36.3*	8.65	269	*46*	8.5
m/q	**Detects**	1	19	19	2	17
	Non-detects	0	0	0	0	0
Station SH-10	**Mean**	NA	--	398	NA	6.4
	Min	*6.2*	8.5	130	*28*	4
11/89-9/94	**Max**	*6.2*	11.77	613	*28*	10.8
m/q	**Detects**	1	14	14	1	12
	Non-detects	0	0	0	0	0
Station SH-11A	**Mean**	5.6	--	373	NA	5.3
	Min	2.55	8.5	163	*5.6*	2.2
11/89-pres.	**Max**	41.9	11.59	628	*46*	14.6
m/q	**Detects**	22	22	22	2	20
	Non-detects	0	0	0	0	0
Station SH-11B	**Mean**	6.9	--	341	NA	5.2
	Min	5.65	8.31	157	*0.93*	2.1
11/89-pres.	**Max**	7.93	9.59	418	*55*	12
m/q	**Detects**	19	20	20	2	19
	Non-detects	0	0	0	0	0
Station SH-12	**Mean**	2.8	--	270	NA	5.4
	Min	1.9	8.04	175	*4.7*	2.3
11/89-9/94	**Max**	3.56	9.59	326	*22*	11
m/q	**Detects**	20	20	20	2	18
	Non-detects	0	0	0	0	0

Table G-3. Summary of Ground Water Data from the Sherman Creek Drainage (cont'd)

Station		Depth to Water (feet)	Field pH (units)	Field Cond (μmhos/cm)	Field Turb (NTU)	Water Temp (°C)
Station SH-23	**Mean**	NA	--	307	NA	5.7
	Min	NA	8.03	169	*0.28*	2.4
2/90-9/94	**Max**	NA	9.15	394	*3.3*	12
m/q	**Detects**	0	21	21	2	18
	Non-detects	0	0	0	0	0
Station MS-A1	**Mean**	16	--	94	NA	5.2
	Min	13.46	5.37	23	*22*	2.2
4/91-3/94	**Max**	18.35	7.61	233	*22*	8.4
m/q	**Detects**	13	13	13	1	12
	Non-detects	0	0	0	0	0
Station MS-A5	**Mean**	2.2	--	196	NA	5.6
	Min	0.28	7.43	73	*0.1*	2.1
3/91-pres.	**Max**	6.5	8.69	279	*0.1*	8.5
m/q	**Detects**	10	10	10	1	9
	Non-detects	0	0	0	0	0
Station MS-A6	**Mean**	NA	--	229	NA	4.8
	Min	NA	7	110	*3.2*	0
1/91-pres.	**Max**	NA	8.07	301	*17*	6.5
m/q	**Detects**	0	14	14	2	13
	Non-detects	0	0	0	0	0

Table G-3. Summary of Ground Water Data from the Sherman Creek Drainage (cont'd)

Station		Al (µg/L) Tot.	Al (µg/L) Diss.	As (µg/L) Tot.	As (µg/L) Diss.	Ba (µg/L) Tot.	Ba (µg/L) Diss.	Cd (µg/L) Tot.	Cd (µg/L) Diss.	Cr (µg/L) Tot.	Cr (µg/L) Diss.
Station SH-3	**Mean**	6,785	NA	10	4.2	162	NA	0.64	NA	14	NA
	Min	300	*<100*	5	3	500	*<500*	0.22	*<0.2*	10	*<10*
8/89-pres.	**Max**	59,000	*<500*	36	19	1,200	*<500*	2	*<2*	150	*<50*
m/q	**Detects**	36	3	24	9	4	0	12	0	10	0
	Non-detects	1	35	13	29	33	38	25	38	27	38
Station SH-4	**Mean**	104,990	28	323	NA	538	NA	11	NA	183	NA
	Min	1,500	100	13	*<1*	500	*<500*	0.7	*<0.5*	20	*<10*
11/89-pres.	**Max**	1,490,000	200	2,900	*7*	7,400	*<500*	300	*15*	2,480	*<50*
m/q	**Detects**	30	3	29	1	10	0	11	1	21	0
	Non-detects	1	28	2	30	21	31	20	30	10	31
Station SH-7	**Mean**	7,091	492	NA	NA	398	NA	NA	NA	31	26
	Min	500	200	<5	*<5*	700	*<500*	*<0.5*	*<0.5*	10	40
11/89-9/94	**Max**	36,000	1,000	8	*32*	1,300	*1,200*	*32*	*<2*	100	90
irr.	**Detects**	11	8	1	0	3	2	2	0	6	3
	Non-detects	1	4	10	11	9	10	10	12	6	9
Station SH-8	**Mean**	759	492	NA	NA	NA	NA	NA	NA	NA	NA
	Min	400	300	<5	<5	*<500*	*<500*	<2	<2	*<20*	*<20*
3/90-6/91	**Max**	1,800	700	<5	<5	*<500*	*<500*	<2	<2	*<20*	*<20*
m	**Detects**	16	15	0	0	0	0	0	0	0	0
	Non-detects	0	1	16	16	16	16	16	16	16	16
Station SH-9A	**Mean**	5,563	61	6.4	3.7	NA	NA	NA	NA	21	NA
	Min	100	100	5	3.3	*<500*	*<500*	*<0.5*	*<0.5*	20	*<10*
11/89-9/94	**Max**	43,000	700	18	8	*500*	*<500*	*<2*	*<2*	180	*<50*
m/q	**Detects**	25	6	14	5	1	0	1	0	8	0
	Non-detects	2	21	13	22	26	27	26	27	19	27
Station SH-9B	**Mean**	936	NA	16	10	NA	NA	0.52	NA	NA	NA
	Min	100	*<100*	7	6	*<500*	*<500*	0.7	*<0.5*	*<10*	*<10*
4/90-9/94	**Max**	7,900	*<500*	52	24	*<500*	*<500*	1.4	*<2*	*<50*	*<50*
m/q	**Detects**	17	5	27	23	0	0	3	1	1	1
	Non-detects	11	23	1	5	28	28	25	27	27	27
Station SH-10	**Mean**	421	105	6.6	5.2	NA	NA	NA	NA	NA	NA
	Min	100	100	5	4.4	*<500*	*<500*	*<0.5*	*<0.5*	*<10*	*<10*
11/89-9/94	**Max**	1,400	300	10.5	10.5	*<500*	*<500*	*<2*	*<2*	*<50*	*<50*
m/q	**Detects**	20	11	15	10	0	0	0	0	0	0
	Non-detects	2	11	7	12	22	22	22	22	22	22
Station SH-11A	**Mean**	315	89	5.2	NA	NA	NA	NA	NA	NA	NA
	Min	100	100	0.51	*<0.5*	*<500*	*<500*	*<0.2*	*<0.2*	*<10*	*<10*
11/89-pres.	**Max**	2,200	200	15	*<5*	*<500*	*<500*	*4*	*<2*	*<50*	*<50*
m/q	**Detects**	29	15	5	1	0	0	3	0	1	1
	Non-detects	9	23	33	37	38	38	35	38	37	37
Station SH-11B	**Mean**	77,300	1,023	57	30	1,557	NA	1.4	NA	180	NA
	Min	500	100	0.98	13	500	*<500*	0.6	*<0.2*	40	*<10*
11/89-pres.	**Max**	585,000	13,900	360	304	7,000	*1,000*	9	*<2*	1,400	*<50*
m/q	**Detects**	35	22	35	34	24	1	12	1	24	2
	Non-detects	2	15	2	3	13	36	25	36	13	35
Station SH-12	**Mean**	782	31	7.3	4.8	NA	NA	0.47	NA	NA	NA
	Min	100	100	5	4	*<500*	*<500*	0.6	*<0.5*	*<10*	*<10*
11/89-9/94	**Max**	5,300	400	15	13	*770*	*<500*	4	*<2*	*<50*	*<50*
m/q	**Detects**	20	4	21	15	2	0	4	0	0	0
	Non-detects	11	28	10	17	29	32	27	32	31	32

Table G-3. Summary of Ground Water Data from the Sherman Creek Drainage (cont'd)

		Al (µg/L)		As (µg/L)		Ba (µg/L)		Cd (µg/L)		Cr (µg/L)	
Station		**Tot.**	**Diss.**	**Tot.**	**Diss.**	**Tot.**	**Diss.**	**Tot.**	**Diss.**	**Tot.**	**Diss.**
Station SH-23	**Mean**	161	NA	9.7	8.0	NA	NA	NA	NA	NA	NA
	Min	200	*<100*	5	5	*<500*	*<500*	*<0.5*	*<0.5*	*<10*	*<10*
2/90-9/94	**Max**	800	*<500*	14	13	*<500*	*<500*	*<2*	*<2*	*<50*	*<50*
m/q	**Detects**	8	0	28	26	0	0	2	1	0	0
	Non-detects	24	32	4	6	32	32	30	31	32	32
Station MS-A1	**Mean**	175,580	NA	269	NA	842	NA	2.9	NA	432	NA
	Min	48,000	*<100*	9	*<5*	500	*<500*	1	*<0.5*	90	*<10*
4/91-3/94	**Max**	462,000	*1,400*	550	*<5*	2,600	*<500*	20	*<2*	1,230	*<20*
m/q	**Detects**	18	1	18	0	15	0	14	0	18	1
	Non-detects	1	18	1	19	4	19	5	19	1	18
Station MS-A5	**Mean**	72,517	NA	218	68	808	NA	9.7	NA	155	NA
	Min	700	*<100*	31	26	600	*<500*	0.31	*<0.2*	10	*<10*
3/91-pres.	**Max**	770,000	*12,000*	1,700	134	7,000	*1,500*	94	*2.6*	1,700	*<50*
m/q	**Detects**	18	2	17	17	6	1	9	2	6	2
	Non-detects	1	17	1	1	13	18	10	17	13	17
Station MS-A6	**Mean**	75	NA	6.2	5.2	NA	NA	NA	NA	NA	NA
	Min	100	*<100*	5	4.8	*<500*	*<500*	*<0.2*	*<0.2*	*<10*	*<10*
1/91-pres.	**Max**	600	*<500*	11	7	*<500*	*<500*	*<2*	*<2*	*<50*	*<50*
m/q	**Detects**	6	2	20	11	0	0	0	0	0	0
	Non-detects	20	24	6	15	26	26	26	26	26	26

Table G-3. Summary of Ground Water Data from the Sherman Creek Drainage (cont'd)

		Cu (µg/L)		Fe (µg/L)		Pb (µg/L)		Mn (µg/L)		Hg (µg/L)	
Station		Tot.	Diss.	Tot.	Diss.	Tot.	Diss.	Tot.	Diss.	Tot.	Diss.
Station SH-3	Mean	82	3.5	17,128	30	17	NA	591	52	NA	NA
	Min	10	8	280	50	4	<1	50	20	<0.05	<0.05
8/89-pres.	Max	880	20.5	160,000	220	250	<20	4,500	75	<1	<1
m/q	Detects	31	4	36	6	18	2	36	36	0	0
	Non-detects	6	34	1	31	19	35	1	2	37	38
Station SH-4	Mean	1,244	NA	195,690	NA	37	NA	6,898	53	0.18	NA
	Min	10	<5	2,230	<50	14	<1	20	20	0.2	<0.05
11/89-pres.	Max	16,200	<20	2,890,000	160	280	<20	81,300	240	1.3	<1
m/q	Detects	30	1	30	2	18	1	31	26	.4	0
	Non-detects	1	30	1	29	13	30	0	5	27	31
Station SH-7	Mean	44	8.3	9,802	NA	31	1.5	205	NA	NA	NA
	Min	8	5	50	<50	7	1	20	<20	<0.1	<0.1
11/89-9/94	Max	150	16	70,000	320	190	3	1,300	31	<1	<1
irr.	Detects	10	7	11	2	7	3	7	1	0	0
	Non-detects	2	5	1	10	5	9	5	11	12	12
Station SH-8	Mean	7.0	NA	551	NA	NA	NA	8.3	NA	NA	NA
	Min	10	<10	120	<50	<20	<20	20	<20	<1	<1
3/90-6/91	Max	20	10	2,950	80	<20	<20	70	<20	<1	<1
m	Detects	5	1	14	1	0	0	3	0	1	0
	Non-detects	11	15	2	15	16	16	13	16	15	16
Station SH-9A	Mean	127	5.1	11,129	679	9.6	0.91	757	461	NA	NA
	Min	5	6	460	60	2	1	120	30	<0.1	<0.1
11/89-9/94	Max	580	22	74,100	1,540	52	2	1,980	710	<1	<1
m/q	Detects	24	6	27	23	9	4	27	26	0	0
	Non-detects	3	21	0	4	17	22	0	1	27	27
Station SH-9B	Mean	21	5.0	1,979	112	5.8	1.1	174	134	NA	NA
	Min	9	8	50	230	1	1	70	30	<0.05	<0.05
4/90-9/94	Max	110	15	17,000	1,250	11.5	3	690	690	<1	<1
m/q	Detects	14	4	25	4	10	5	27	27	0	0
	Non-detects	14	24	3	24	18	23	1	1	28	28
Station SH-10	Mean	8.9	NA	699	22	8.0	NA	24	NA	NA	NA
	Min	7	<5	55	50	5	<1	20	<20	<0.1	<0.1
11/89-9/94	Max	25	<20	3,500	140	14	<20	120	110	<1	<1
m/q	Detects	7	2	19	3	5	2	10	2	0	0
	Non-detects	15	20	3	19	17	20	12	20	22	22
Station SH-11A	Mean	9.4	3.1	519	50	5.7	NA	15	NA	NA	NA
	Min	2.2	5	50	80	1	<1	20	<15	<0.05	<0.05
11/89-pres.	Max	40	20	3,800	110	67	<20	150	<20	<1	<1
m/q	Detects	19	5	37	4	15	3	7	0	0	0
	Non-detects	18	32	1	34	22	34	31	38	38	38
Station SH-11B	Mean	521	22	138,790	2,202	37	5	3,402	101	NA	NA
	Min	6	5	710	62	1	1	20	20	<0.05	<0.05
11/89-pres.	Max	2,900	613	990,000	37,200	250	125	21,000	1,960	<1	<1
m/q	Detects	34	7	36	25	23	5	35	14	3	0
	Non-detects	3	30	1	12	14	32	2	23	34	37
Station SH-12	Mean	9.0	NA	982	29	7.1	1.1	62	33	NA	NA
	Min	5	<5	70	50	1	1	20	20	<0.05	<0.05
11/89-9/94	Max	30	<20	8,200	310	38	2	280	70	<1	<1
m/q	Detects	13	2	30	6	12	6	31	24	0	0
	Non-detects	18	30	1	26	19	26	0	8	31	32

Table G-3. Summary of Ground Water Data from the Sherman Creek Drainage (cont'd)

		Cu (µg/L)		Fe (µg/L)		Pb (µg/L)		Mn (µg/L)		Hg (µg/L)	
Station		**Tot.**	**Diss.**	**Tot.**	**Diss.**	**Tot.**	**Diss.**	**Tot.**	**Diss.**	**Tot.**	**Diss.**
Station SH-23	**Mean**	7.5	5.1	624	NA	1.5	NA	34	25	NA	NA
	Min	7	10	50	*<50*	1	*<1*	20	20	*<0.05*	*<0.05*
2/90-9/94	**Max**	32	20	1,440	*<100*	9	*<20*	60	40	*<1*	*<1*
m/q	**Detects**	9	4	21	0	7	1	29	29	0	0
	Non-detects	23	28	11	32	24	30	3	3	32	32
Station MS-A1	**Mean**	2,358	3.7	331,690	NA	291	1.1	6,646	176	0.23	NA
	Min	1,020	7	62,800	*<50*	157	1	180	20	0.2	*<0.05*
4/91-3/94	**Max**	5,160	20	890,000	*2,600*	660	6	15,100	1,350	0.6	*<1*
m/q	**Detects**	18	3	18	2	15	4	19	13	5	1
	Non-detects	1	16	1	17	4	15	0	6	14	18
Station MS-A5	**Mean**	482	NA	126,970	1,852	77	4.8	3,474	281	0.17	NA
	Min	10	*<2*	150	50	5.4	1	20	20	0.2	*<0.05*
3/91-pres.	**Max**	3,700	*150*	1,405,000	34,700	690	87	32,000	4,870	1.51	*<1*
m/q	**Detects**	17	2	18	5	12	3	19	15	3	0
	Non-detects	2	17	1	14	7	16	0	4	16	19
Station MS-A6	**Mean**	7.0	3.6	518	172	0.8	NA	198	184	NA	NA
	Min	5	6	280	110	1	*<1*	170	20	*0.09*	*0.09*
1/91-pres.	**Max**	30	10	1,390	370	3	*<20*	220	220	*<1*	*<1*
m/q	**Detects**	9	3	25	13	5	1	26	25	1	1
	Non-detects	17	23	1	13	21	25	0	1	25	25

Table G-3. Summary of Ground Water Data from the Sherman Creek Drainage (cont'd)

Station		Mo (μg/L) Tot.	Mo (μg/L) Diss.	Ni (μg/L) Tot.	Ni (μg/L) Diss.	Se (μg/L) Tot.	Se (μg/L) Diss.	Ag (μg/L) Tot.	Ag (μg/L) Diss.
Station SH-3	Mean	NA	NA	14	NA	NA	NA	0.14	NA
	Min	<20	<20	10	<10	<5	<5	0.1	<0.1
8/89-pres.	Max	<500	<500	110	<20	6	8	0.6	<50
m/q	Detects	0	0	11	2	1	2	7	0
	Non-detects	37	38	26	36	36	36	30	38
Station SH-4	Mean	14	NA	167	NA	NA	NA	0.92	NA
	Min	20	<20	10	<10	<5	<5	0.3	<0.1
11/89-pres.	Max	120	<500	2,480	<20	<5	<5	11	<50
m/q	Detects	5	0	27	2	0	0	8	0
	Non-detects	26	31	4	29	31	31	23	31
Station SH-7	Mean	NA	NA	23	NA	NA	NA	NA	NA
	Min	<20	<20	10	<10	<5	<5	<0.1	<0.1
11/89-9/94	Max	<500	<500	80	<20	<5	<5	<50	<50
irr.	Detects	2	2	6	0	0	0	0	0
	Non-detects	10	10	6	12	12	12	12	12
Station SH-8	Mean	30	30	7.7	NA	NA	NA	NA	NA
	Min	20	30	10	<10	<5	<5	<10	<10
3/90-6/91	Max	40	40	20	<10	<5	<5	10	<10
m	Detects	14	12	6	0	0	0	1	0
	Non-detects	2	4	10	16	16	16	15	16
Station SH-9A	Mean	5.7	5.4	12	NA	NA	NA	0.14	NA
	Min	20	20	10	<10	<5	<5	0.1	<0.1
11/89-9/94	Max	80	60	90	<20	<5	<5	0.4	<50
m/q	Detects	3	3	11	0	0	0	4	1
	Non-detects	24	24	16	27	27	27	23	26
Station SH-9B	Mean	NA	NA	NA	NA	NA	NA	0.13	NA
	Min	<20	<20	<10	<10	<5	<5	0.1	<0.1
4/90-9/94	Max	<500	<500	24	<20	6.5	6	0.8	<50
m/q	Detects	0	0	2	2	1	1	3	1
	Non-detects	28	28	26	26	27	27	25	27
Station SH-10	Mean	NA	NA	NA	NA	NA	NA	NA	NA
	Min	<20	<20	<10	<10	<5	<5	<0.1	<0.1
11/89-9/94	Max	<500	<500	<20	<20	<5	<5	<50	<50
m/q	Detects	1	1	1	0	0	0	2	0
	Non-detects	21	21	21	22	22	22	20	22
Station SH-11A	Mean	NA	NA	4.8	NA	NA	NA	0.07	NA
	Min	<20	<20	10	<10	<5	<5	0.1	<0.1
11/89-pres.	Max	<500	<500	100	<20	<5	<5	0.2	<50
	Detects	1	2	6	3	0	0	4	1
m/q	Non-detects	37	36	32	35	38	38	34	37
Station SH-11B	Mean	53	NA	161	4.7	NA	NA	8.5	NA
	Min	20	<20	10	10	<5	<5	0.1	<0.1
11/89-pres.	Max	1,200	500	1,100	60	<50	<5	300	<50
m/q	Detects	9	3	29	5	1	0	8	3
	Non-detects	28	34	8	32	36	37	29	34
Station SH-12	Mean	7.9	NA	NA	NA	NA	NA	0.16	NA
	Min	20	<20	<10	<10	<5	<5	0.1	<0.1
11/89-9/94	Max	40	<500	<20	<20	<5	<5	1	<50
m/q	Detects	4	2	5	2	0	0	5	1
	Non-detects	27	30	26	30	31	32	26	31

Table G-3. Summary of Ground Water Data from the Sherman Creek Drainage (cont'd)

Station		Mo (µg/L) Tot.	Mo (µg/L) Diss.	Ni (µg/L) Tot.	Ni (µg/L) Diss.	Se (µg/L) Tot.	Se (µg/L) Diss.	Ag (µg/L) Tot.	Ag (µg/L) Diss.
Station SH-23	**Mean**	NA	NA	NA	NA	NA	NA	0.84	NA
	Min	*<20*	*<20*	*<10*	*<10*	*<5*	*<5*	0.1	*<0.1*
2/90-9/94	**Max**	*<500*	*<500*	*<20*	*<20*	*<5*	*<5*	10	*<50*
m/q	**Detects**	0	0	1	2	0	0	8	1
	Non-detects	32	32	31	30	32	32	24	31
Station MS-A1	**Mean**	45	NA	309	NA	NA	NA	30	NA
	Min	20	*<20*	70	*<10*	*<5*	*<5*	0.6	*<0.1*
4/91-3/94	**Max**	280	*<20*	820	*10*	*9*	*9*	503	*<10*
m/q	**Detects**	9	0	18	1	2	1	10	2
	Non-detects	10	19	1	18	17	18	9	17
Station MS-A5	**Mean**	19	NA	146	NA	NA	NA	1.7	NA
	Min	20	*<20*	10	*<10*	*<5*	*<5*	0.2	*<0.1*
3/91-pres.	**Max**	200	*<500*	1,600	*60*	*<50*	*<5*	16.4	*<50*
m/q	**Detects**	3	1	9	1	0	0	5	2
	Non-detects	16	18	10	18	19	19	14	17
Station MS-A6	**Mean**	NA	NA	NA	NA	NA	NA	0.06	NA
	Min	*<20*	*<20*	*<10*	*<10*	*<5*	*<5*	0.1	*<0.1*
1/91-pres.	**Max**	*<500*	*<500*	*<20*	*<20*	*<5*	*<5*	0.2	*<50*
m/q	**Detects**	1	0	1	1	0	0	3	1
	Non-detects	25	26	25	25	26	26	23	25

Table G-3. Summary of Ground Water Data from the Sherman Creek Drainage (cont'd)

Station		Zn (µg/L) Tot.	Zn (µg/L) Diss.	CN (free) (µg/L)	CN (WAD) (µg/L)	CN (total) (µg/L)	PO_4-P (µg/L)	NO_2-N (µg/L)
Station SH-3	Mean	248	6.4	NA	NA	NA	36	NA
	Min	30	10	<5	<5	<5	10	<10
8/89-pres.	Max	1,700	140	<5	<5	7	440	<200
m/q	Detects	36	5	0	0	1	21	1
	Non-detects	1	32	10	10	9	17	37
Station SH-4	Mean	502	8.6	9.5	32	9.5	19	14
	Min	20	10	10	7	11	10	10
11/89-pres.	Max	6,320	60	35	40	116	130	400
m/q	Detects	29	11	3	6	8	20	4
	Non-detects	2	20	7	4	2	11	27
Station SH-7	Mean	172	8.9	NA	NA	NA	68	NA
	Min	30	10	<5	<5	<5	10	<10
11/89-9/94	Max	810	50	<5	<5	7	730	<100
irr.	Detects	11	4	0	0	1	4	0
	Non-detects	1	8	8	8	7	9	13
Station SH-8	Mean	18	NA	NA	NA	NA	5.7	NA
	Min	10	<10	<5	<5	<5	10	<10
3/90-6/91	Max	50	10	<5	8	14	20	<10
m	Detects	12	3	0	1	2	4	0
	Non-detects	4	13	9	8	7	12	16
Station SH-9A	Mean	47	NA	NA	NA	NA	45	14
	Min	10	<10	<5	<5	<5	10	10
11/89-9/94	Max	230	<20	<5	<5	9	630	210
m/q	Detects	24	10	0	0	2	18	3
	Non-detects	3	17	9	9	7	9	24
Station SH-9B	Mean	29	6.0	NA	NA	NA	16	NA
	Min	10	10	<5	<5	<5	10	<10
4/90-9/94	Max	260	20	<5	<5	<5	160	<100
m/q	Detects	19	6	0	0	0	15	0
	Non-detects	9	22	7	7	7	13	28
Station SH-10	Mean	28	NA	NA	NA	NA	13	NA
	Min	10	<10	<5	<5	<5	10	<10
11/89-9/94	Max	92	<20	<5	<5	<5	90	<100
m/q	Detects	17	2	0	0	0	11	1
	Non-detects	5	20	9	9	9	11	21
Station SH-11A	Mean	22	5.4	NA	NA	NA	23	65
	Min	10	10	<5	<5	<5	10	70
11/89-pres.	Max	150	14	<5	<5	<5	450	240
m/q	Detects	28	4	0	0	0	15	9
	Non-detects	9	33	11	11	11	23	29
Station SH-11B	Mean	464	27	NA	NA	NA	665	5
	Min	10	10	<5	<5	<5	10	10
11/89-pres.	Max	2,700	800	<5	5	9	21,000	30
m/q	Detects	35	7	0	1	1	27	5
	Non-detects	1	29	10	9	9	10	32
Station SH-12	Mean	29	4.7	N/A	N/A	N/A	18	NA
	Min	10	10	<5	<5	<5	10	<10
11/89-9/94	Max	260	50	<5	7	18	80	340
m/q	Detects	18	5	0	1	2	17	3
	Non-detects	13	27	10	9	8	15	29

Table G-3. Summary of Ground Water Data from the Sherman Creek Drainage (cont'd)

Station		Zn (μg/L) Tot.	Diss.	CN (free) (μg/L)	CN (WAD) (μg/L)	CN (total) (μg/L)	PO_4-P (μg/L)	NO_2-N (μg/L)
Station SH-23	**Mean**	13	5.7	NA	NA	NA	11	NA
	Min	10	10	*<5*	*<5*	*<5*	10	*<10*
2/90-9/94	**Max**	70	80	*<5*	*<5*	*<5*	80	*280*
m/q	**Detects**	14	5	0	0	0	15	2
	Non-detects	18	27	9	9	9	17	30
Station MS-A1	**Mean**	677	NA	NA	NA	NA	69	10
	Min	10	*<10*	NA	NA	NA	10	10
4/91-3/94	**Max**	1,840	*10*	NA	NA	NA	440	40
m/q	**Detects**	19	6	0	0	0	18	6
	Non-detects	0	13	0	0	0	1	13
Station MS-A5	**Mean**	533	NA	NA	NA	NA	76	17
	Min	10	*<10*	NA	NA	NA	10	10
3/91-pres.	**Max**	4,000	*150*	NA	NA	NA	370	280
m/q	**Detects**	18	2	0	0	0	15	3
	Non-detects	1	17	0	0	0	4	16
Station MS-A6	**Mean**	11	8.1	NA	NA	NA	10	NA
	Min	10	10	NA	NA	NA	10	*<10*
1/91-pres.	**Max**	40	22	NA	NA	NA	40	*<200*
m/q	**Detects**	11	5	0	0	0	8	0
	Non-detects	15	21	0	0	0	18	26

Table G-3. Summary of Ground Water Data from the Sherman Creek Drainage (cont'd)

Station		NO3-N (µg/L)	NO3+NO2-N (µg/L)	NH4-N (µg/L)	pH (s.u.)	TDS (mg/L)	Cond (µmhos/cm)	TSS (mg/L)
Station SH-3	Mean	174	194	74	--	165	283	395
	Min	10	10	10	7.4	123	252	13
8/89-pres.	Max	3,550	3,550	530	8.3	200	342	2,600
m/q	Detects	23	24	26	38	38	38	38
	Non-detects	15	13	8	0	0	0	0
Station SH-4	Mean	593	32	76	--	42	65	5,303
	Min	40	40	10	5.7	18	29	358
11/89-pres.	Max	5,220	5,220	440	6.8	76	171	49,500
m/q	Detects	28	28	18	31	31	31	31
	Non-detects	3	3	13	0	0	0	0
Station SH-7	Mean	574	577	350	--	983	4,304	827
	Min	20	20	120	8.6	332	395	18
11/89-9/94	Max	2,960	3,000	910	12.6	2,142	9,500	3,760
irr.	Detects	8	8	12	13	13	13	12
	Non-detects	5	5	1	0	0	0	0
Station SH-8	Mean	208	208	233	--	758	3,287	38
	Min	30	30	30	11.5	564	1,250	4
3/90-6/91	Max	1,020	1,020	510	12.4	1,132	5,630	210
m	Detects	13	13	16	16	16	16	16
	Non-detects	3	3	0	0	0	0	0
Station SH-9A	Mean	94	107	128	--	101	182	411
	Min	10	20	10	6.7	100	127	3
11/89-9/94	Max	1,320	1,320	930	9.2	186	263	3,072
m/q	Detects	8	8	20	27	27	27	27
	Non-detects	19	19	7	0	0	0	0
Station SH-9B	Mean	48	48	71	--	140	233	42
	Min	10	10	10	6.6	52	55.5	1
4/90-9/94	Max	850	850	280	8.3	172	304	300
m/q	Detects	7	7	19	28	28	28	27
	Non-detects	21	21	9	0	0	0	1
Station SH-10	Mean	32	32	318	--	146	331	24
	Min	20	20	30	8.6	110	159	1
11/89-9/94	Max	360	360	910	11.2	322	700	105
m/q	Detects	6	6	19	22	22	22	22
	Non-detects	16	16	3	0	0	0	0
Station SH-11A	Mean	94	111	160	--	240	497	24
	Min	10	10	10	9.1	0	294	2.5
11/89-pres.	Max	870	870	360	12.2	1,086	3,700	194
m/q	Detects	19	20	30	38	37	38	34
	Non-detects	19	18	4	0	0	0	4
Station SH-11B	Mean	86	91	486	--	395	406	2,388
	Min	10	10	60	8	192	302	3
11/89-pres.	Max	780	780	10,000	12	1,900	995	20,680
m/q	Detects	19	20	30	37	35	37	37
	Non-detects	18	17	3	0	0	0	0
Station SH-12	Mean	215	229	208	--	185	299	37
	Min	10	10	10	7.9	144	263	1
11/89-9/94	Max	2,500	2,500	470	9.9	265	344	290
m/q	Detects	22	23	31	32	32	32	32
	Non-detects	10	9	1	0	0	0	0

Table G-3. Summary of Ground Water Data from the Sherman Creek Drainage (cont'd)

Station		NO_3-N (µg/L)	NO_3+NO_2-N (µg/L)	NH_4-N (µg/L)	pH (s.u.)	TDS (mg/L)	Cond (µmhos/cm)	TSS (mg/L)
Station SH-23	**Mean**	67	77	184	--	201	339	8
	Min	10	10	30	7.9	0	295	1
2/90-9/94	**Max**	800	800	670	8.7	244	411	50
m/q	**Detects**	15	15	30	32	31	32	23
	Non-detects	17	17	2	0	0	0	9
Station MS-A1	**Mean**	212	219	149	--	81	119	19,603
	Min	10	10	10	6.2	52	60	108
4/91-3/94	**Max**	2,160	2,180	780	8	156	268	152,000
m/q	**Detects**	13	13	16	19	19	19	19
	Non-detects	6	6	3	0	0	0	0
Station MS-A5	**Mean**	158	183	166	--	172	257	5,765
	Min	10	10	10	7.6	121	208	23
3/91-pres.	**Max**	870	870	950	8.4	252	305	63,700
m/q	**Detects**	12	12	14	19	19	19	19
	Non-detects	7	7	4	0	0	0	0
Station MS-A6	**Mean**	121	122	63	--	169	282	3.8
	Min	10	10	10	7.5	133	200	1
1/91-pres.	**Max**	1,560	1,560	200	8.1	190	317	17
m/q	**Detects**	9	9	15	26	26	26	17
	Non-detects	17	17	7	0	0	0	9

Table G-3. Summary of Ground Water Data from the Sherman Creek Drainage (cont'd)

Station		Turbidity (NTU)	Sett. Solids (ml/L)	SAR (units)	B (mg/L)	Na (mg/L)	K (mg/L)	Ca (mg/L)	Mg (mg/L)	F (mg/L)	Cl (mg/L)
Station SH-3	Mean	217	0.69	0.30	0.07	8.1	2.1	38	11	0.09	7.0
	Min	4.2	0.1	0.12	0.01	2.9	1.5	22.6	5.7	0.05	4.7
8/89-pres.	Max	1,800	7.6	0.44	0.17	11	5.78	63.3	52.9	0.16	9.95
m/q	Detects	38	25	38	30	38	37	38	38	36	38
	Non-detects	0	12	0	8	0	1	0	0	2	0
Station SH-4	Mean	2,122	8.7	0.27	0.06	2.8	0.85	6.1	2.5	0.07	2.5
	Min	120	0.5	0.1	0.01	1	0.2	1.47	0.1	0.04	1.2
11/89-pres.	Max	14,100	43	0.52	0.15	4.7	5.69	19	26	0.18	4.9
m/q	Detects	31	30	31	26	31	31	31	31	29	31
	Non-detects	0	0	0	5	0	0	0	0	2	0
Station SH-7	Mean	250	4.5	1.4	0.10	68	14	297	66	0.79	12
	Min	8.6	0.3	0.63	0.02	36	0.5	2.63	0.6	0.08	8.8
11/89-9/94	Max	1,400	9	4.16	0.65	119	68	939	302	3	19
irr.	Detects	13	9	13	9	13	13	13	13	13	13
	Non-detects	0	2	0	4	0	0	0	0	0	0
Station SH-8	Mean	24	NA	0.56	0.05	36	6.9	282	22	0.39	7.3
	Min	3.5	*<0.1*	0.345	0.01	21.5	5.6	25	1.1	0.21	5.5
3/90-6/91	Max	125	*12*	0.75	0.085	43	9	470	118	0.64	10
m	Detects	16	2	16	14	16	16	16	16	16	16
	Non-detects	0	13	0	2	0	0	0	0	0	0
Station SH-9A	Mean	179	0.08	0.48	0.07	9.1	1.7	21	4.9	0.08	6.9
	Min	1	0.1	0.2	0.01	4	0.4	2.4	0.5	0.03	3.8
11/89-9/94	Max	900	0.6	2.44	0.26	42	8.4	33	16	0.4	18
m/q	Detects	27	10	27	25	27	26	27	27	26	27
	Non-detects	0	17	0	2	0	1	0	0	1	0
Station SH-9B	Mean	30	NA	0.45	0.09	10	1.3	26	7.2	0.14	7.8
	Min	0.5	*<0.1*	0.23	0.01	2.5	0.2	6	2.05	0.02	5.1
4/90-9/94	Max	310	*<1*	0.58	0.2	13	2.5	36	20	1.46	11.95
m/q	Detects	28	4	28	27	28	28	28	28	26	28
	Non-detects	0	23	0	1	0	0	0	0	2	0
Station SH-10	Mean	13	0.15	1.1	0.08	20	2.1	24	3.2	0.24	7.0
	Min	1	0.2	0.63	0.01	16	0.5	7.11	0.2	0.16	4.7
11/89-9/94	Max	40	1.7	1.73	0.18	24	3.7	94	12	0.89	9.2
m/q	Detects	22	5	22	19	22	22	22	22	22	22
	Non-detects	0	16	0	3	0	0	0	0	0	0
Station SH-11A	Mean	14	0.06	7.9	0.41	73	2.8	15	1.8	2.6	10
	Min	0	0.2	1.17	0.04	58	0.3	1.1	0.1	0.61	7.3
11/89-pres.	Max	100	0.7	13.1	0.56	85	20	389	7.9	5	13
m/q	Detects	37	4	38	36	38	38	38	38	38	38
	Non-detects	0	33	0	2	0	0	0	0	0	0
Station SH-11B	Mean	3,864	0.60	4.8	0.52	79	13	24	13	2.8	10
	Min	2	0.1	1.15	0.05	58	1.6	2.2	0.6	1.09	6.7
11/89-pres.	Max	37,500	19	8.7	0.86	94.5	59	199	95.6	5.17	23
m/q	Detects	37	8	37	34	37	37	37	36	37	37
	Non-detects	0	28	0	3	0	0	0	1	0	0
Station SH-12	Mean	17	NA	2.4	0.41	42	1.5	16	5.3	0.90	6.8
	Min	0.4	*<0.1*	1.57	0.31	31	0.7	2.1	1.7	0.62	4
11/89-9/94	Max	145	*0.3*	4.6	0.55	66	3.1	24	15	1.75	9.6
m/q	Detects	32	2	32	31	32	32	32	32	32	32
	Non-detects	0	29	0	1	0	0	0	0	0	0

Table G-3. Summary of Ground Water Data from the Sherman Creek Drainage (cont'd)

Station		Turbidity (NTU)	Sett. Solids (ml/L)	SAR (units)	B (mg/L)	Na (mg/L)	K (mg/L)	Ca (mg/L)	Mg (mg/L)	F (mg/L)	Cl (mg/L)
Station SH-23	**Mean**	3.5	NA	3.0	0.22	50	2.3	12	6.4	0.29	5.2
	Min	0	*<0.1*	2.38	0.03	44	1.7	5.61	2.88	0.21	2.8
2/90-9/94	**Max**	24	*0.4*	4.32	0.32	54	3.3	20	9.8	0.56	14
m/q	**Detects**	31	2	32	30	32	32	32	32	31	31
	Non-detects	0	29	0	2	0	0	0	0	1	1
Station MS-A1	**Mean**	13,688	44	0.31	0.06	4.7	0.84	14	3.4	0.05	3.7
	Min	270	1	0.23	0.01	3	0.3	1.7	1.5	0.02	1.7
4/91-3/94	**Max**	138,000	510	0.54	0.14	6.9	2.3	39	10	0.11	5.3
m/q	**Detects**	19	19	19	18	19	18	19	18	19	19
	Non-detects	0	0	0	1	0	1	0	1	0	0
Station MS-A5	**Mean**	2,812	1.2	1.1	0.11	24	2.5	28	12	0.13	4.3
	Min	7.5	0.1	0.448	0.02	21	1	0.93	0.63	0.1	2.2
3/91-pres.	**Max**	22,000	12	1.27	0.55	26	8.56	142	59.3	0.18	11
m/q	**Detects**	19	8	19	17	19	19	19	19	17	19
	Non-detects	0	11	0	1	0	0	0	0	2	0
Station MS-A6	**Mean**	4.1	NA	0.16	0.07	4.5	0.44	49	5.4	0.05	4.1
	Min	1.3	*<0.1*	0.13	0.01	3.5	0.2	6.45	0.6	0.02	2.1
1/91-pres.	**Max**	9.5	*0.1*	0.2	0.16	5.3	0.9	64.2	31	0.07	8.3
m/q	**Detects**	26	1	26	21	26	20	26	26	20	26
	Non-detects	0	25	0	5	0	6	0	0	6	0

Table G-3. Summary of Ground Water Data from the Sherman Creek Drainage (cont'd)

Station		SO_4 (mg/L)	OH (mg/L)	CO_3 (mg/L)	HCO_3 (mg/L as HCO_3)	Tot Alk (mg/L as $CaCO_3$)	Acidity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)
Station SH-3	**Mean**	6.9	0.01	1.1	167	140	NA	143
	Min	3.9	0	0	65	117	*<1*	107
8/89-pres.	**Max**	18	0.017	1.9	290	234	*<10*	303
m/q	**Detects**	38	6	6	38	38	0	38
	Non-detects	0	0	0	0	0	38	0
Station SH-4	**Mean**	9.2	NA	NA	15	13	NA	25
	Min	4.1	*0*	*0*	7	6	*<1*	10
11/89-pres.	**Max**	20	*0.001*	*0.002*	51	42	*27.6*	122
m/q	**Detects**	31	1	2	31	31	2	31
	Non-detects	0	1	0	0	0	29	0
Station SH-7	**Mean**	17	382	51	NA	1,222	NA	1,014
	Min	0.6	0	4.68	*0*	150	*<1*	69
11/89-9/94	**Max**	49	897	167	*290*	2,841	<2	2,518
irr.	**Detects**	13	12	13	2	13	0	13
	Non-detects	0	0	0	0	0	13	0
Station SH-8	**Mean**	15	281	26	NA	857	NA	794
	Min	3.2	0	0	*0*	605	*<1*	545
3/90-6/91	**Max**	66	423	80	*816*	1,298	*<1*	1,292
m	**Detects**	16	15	15	1	16	0	16
	Non-detects	0	0	0	0	0	16	0
Station SH-9A	**Mean**	0.11	NA	NA	101	84	NA	74
	Min	0.5	*0*	*0*	88	73	*<1*	46
11/89-9/94	**Max**	24	*0.269*	*10*	148	121	<2	106
m/q	**Detects**	25	2	2	27	27	0	27
	Non-detects	2	0	0	0	0	27	0
Station SH-9B	**Mean**	20	NA	NA	107	88	NA	95
	Min	0.7	*0*	*0*	15	12	*<1*	23
4/90-9/94	**Max**	30	*0.017*	*0.72*	116	96	<2	111
m/q	**Detects**	28	2	2	28	28	0	28
	Non-detects	0	0	0	0	0	28	0
Station SH-10	**Mean**	35	19	12	55	75	NA	73
	Min	27	0	0	0	34	*<1*	34
11/89-9/94	**Max**	41	82	33	77	298	<2	283
m/q	**Detects**	22	18	20	6	22	0	22
	Non-detects	0	0	0	0	0	22	0
Station SH-11A	**Mean**	28	46	50	78	165	NA	45
	Min	24	0	0	0	120	*<1*	6
11/89-pres.	**Max**	35	375	80	169	1,198	*<10*	998
m/q	**Detects**	37	12	36	32	38	0	38
	Non-detects	1	0	0	0	0	38	0
Station SH-11B	**Mean**	45	28	9.2	240	209	NA	114
	Min	22	0	0	85	125	*<1*	8
11/89-pres.	**Max**	98	170	39	670	560	*<10*	940
m/q	**Detects**	37	6	28	35	37	0	37
	Non-detects	0	0	2	1	0	37	0
Station SH-12	**Mean**	28	NA	9.7	133	115	NA	61
	Min	20	*0*	0	4	77	*<1*	20
11/89-9/94	**Max**	44	*0.135*	44	148	121	<2	77
m/q	**Detects**	32	2	11	32	32	0	32
	Non-detects	0	0	0	0	0	32	0

Table G-3. Summary of Ground Water Data from the Sherman Creek Drainage (cont'd)

Station		SO_4 (mg/L)	OH (mg/L)	CO_3 (mg/L)	HCO_3 (mg/L as HCO_3)	Tot Alk (mg/L as $CaCO_3$)	Acidity (mg/L as $CaCO_3$)	Hardness (mg/L as $CaCO_3$)
Station SH-23	**Mean**	53	NA	2.5	128	107	NA	56
	Min	25	*0*	0	115	97	*<1*	26
2/90-9/94	**Max**	78	*0.054*	10	141	117	<2	81
m/q	**Detects**	31	2	13	31	31	0	32
	Non-detects	1	0	1	0	0	32	0
Station MS-A1	**Mean**	9.8	NA	NA	57	47	NA	48
	Min	3.6	*0*	*0*	23	19	*<1*	21
4/91-3/94	**Max**	49	*0*	*0*	144	118	*<1*	122
m/q	**Detects**	19	0	0	19	19	0	19
	Non-detects	0	0	0	0	0	19	0
Station MS-A5	**Mean**	42	0.03	6.2	181	148	NA	123
	Min	37	0	0	98	80	*<1*	74
3/91-pres.	**Max**	50	0.043	9.89	960	790	*<10*	598
m/q	**Detects**	19	3	3	19	19	0	19
	Non-detects	0	0	0	0	0	19	0
Station MS-A6	**Mean**	13	0.01	0.57	161	132	NA	143
	Min	9.7	0	0	134	110	*<1*	120
1/91-pres.	**Max**	14	0.014	0.83	171	140	*<10*	173
m/q	**Detects**	26	6	6	26	26	0	26
	Non-detects	0	0	0	0	0	26	0

Notes: Dates give period of sample collection; sampling frequency given below; m = monthly; q = quarterly; irr. = irregular.
- Minimum and maximum detected values are shown for sets with sufficient data for robust statistical analysis.
- Italics indicate overall minimum and maximum values (considering non-detects) for sets with insufficient data for robust statistical analysis.
- NA – "No Data Available for Analysis" indicates no analyses were conducted for constituent.
- Source: Montgomery Watson, 1996a.

Table G-4. Summary of Ground Water Data from the Terrace Area Drainage Basin

Parameter[1]	MDL	unit	Mean[2]	Std. Dev.[2]	Median[2]	Low	High	n>MDL[3]
Al-dissolved	0.5	mg/L	<0.5	--	--	--	--	0
Al-total	0.5-1.0	mg/L	29	50	1.6	<0.5	160	11
As-dissolved	0.0005	mg/L	0.005	0.003	0.006	<0.0005	0.013	16
As-total	0.0005-0.001	mg/L	0.025	0.027	0.013	0.0015	0.091	17
Ba-dissolved	0.5	mg/L	<0.5	--	<0.5	<0.5	0.75	1
Ba-total	0.5	mg/L	0.39	0.27	<0.5	<0.5	1.1	4
Cd-dissolved	0.0002	mg/L	<0.0002	--	<0.0002	<0.0002	8.2	1
Cd-total	0.0002	mg/L	0.0007	0.0011	0.0003	<0.0002	0.0038	9
Cr-dissolved	0.02	mg/L	<0.02	--	--	--	--	0
Cr-total	0.02	mg/L	0.01	0.10	<0.02	<0.02	0.29	6
Cu-dissolved	0.002	mg/L	0.003	0.007	<0.002	<0.002	0.028	3
Cu-total	0.002-0.008	mg/L	0.1360	0.2700	0.0220	<0.002	1.1	13
Fe-dissolved	0.05-1.0	mg/L	1.2	1.5	0.28	<0.05	5.2	14
Fe-total	0.05	mg/L	39.7	75.2	3.7	0.26	240	17
Pb-dissolved	0.002	mg/L	<0.002	--	<0.002	<0.002	0.0035	1
Pb-total	0.002	mg/L	0.032	0.048	0.005	<0.002	0.13	13
Mg-total	1-2	mg/L	8.82	6.31	7.00	1.99	27.6	17
Mn-dissolved	0.015	mg/L	0.48	0.38	0.46	0.023	1.6	17
Mn-total	0.015	mg/L	1.4	1.7	0.78	0.045	6.2	17
Hg-dissolved	0.2	µg/L	<0.2	--	--	--	--	0
Hg-total	0.2	µg/L	0.18	0.15	<0.2	<0.2	0.5	4
Mo-dissolved	0.5	mg/L	<0.5	--	--	--	--	0
Mo-total	0.5	mg/L	<0.5	--	--	--	--	0
Ni-dissolved	0.01	mg/L	<0.01	--	--	--	--	0
Ni-total	0.01	mg/L	0.06	0.09	<0.01	<0.01	0.29	6
Se-dissolved	0.005	mg/L	<0.005	--	--	--	--	0
Se-total	0.005	mg/L	<0.005	--	--	--	--	0
Ag-dissolved	0.0005	mg/L	<0.0005	--	--	--	--	0
Ag-total	0.0005	mg/L	0.0007	0.0010	<0.0005	<0.0005	0.0042	5
Zn-dissolved	0.01	mg/L	0.028	0.032	0.018	<0.01	0.14	14
Zn-total	0.01	mg/L	0.19	0.24	0.070	0.011	0.81	17

1. Dissolved and total metal concentrations; dissolved Mg not reported.
2. Mean, standard deviation and median computed using values of one-half method detection limit (MDL) for non-detects.
3. Number of analyses greater than the MDL; total analyses = 17.

Source: SRK, 1996e

Table G-4. Summary of Ground Water Data from the Terrace Area Drainage Basin (continued)

Parameter	MDL	unit	Mean[1]	Std. Dev.[1]	Median[1]	Low	High	n>MDL[2]
Boron	0.05	mg/L	0.12	0.08	0.11	<0.05	0.3	14
Calcium	1-20	mg/L	54.3	35.3	48.0	17.6	174	17
Potassium	1	mg/L	4.35	4.69	3.57	<1	21.4	15
Sodium	1.0-5.0	mg/L	26.0	13.7	23.1	10.1	62.5	17
Cation Sum	0.001	meq/L	4.74	2.45	4.28	2.13	13.5	17
Chloride	1-10	mg/L	23.7	13.0	20.8	8.52	50.9	17
Fluoride	0.1	mg/L	0.07	0.05	<0.1	<0.1	0.22	3
Carbonate	0.001	mg/L	0.734	0.808	0.409	0.001	2.52	17
Bicarbonate-calc.	0.001	mg/L	189	130	183	24.2	598	17
Nitrite-N	0.1-0.2	mg/L	<0.2	--	--	--	--	0
Nitrate-N	0.1-0.2	mg/L	0.136	--	<0.1	<0.1	0.704	2
NO_2+NO_2	0.2	mg/L	0.168	--	<0.2	<0.2	0.704	2
Hydroxide	0.001	mg/L	0.009	0.010	0.003	<0.001	0.027	14
Orthophosphate	0.05	mg/L	1.1	2.0	<0.05	<0.05	6.4	8
Sulfate	2-20	mg/L	9.2	12.7	4.59	<2	51.4	11
Anion Sum	0.001	meq/L	4.0	2.3	3.7	1.4	11.5	17
Anion/Cation	0.001	percent	10.5	11.2	7.05	1.68	46.2	17
pH-lab	0.001	units	--	--	7.3	5.8	8.2	17
Acidity	10	mg/L	14.3	--	<10	<10	90	2
Alkalinity	2	mg/L	155	106	150	19.8	490	17
Conductivity	4	umhos/com	370	131	375	145	625	17
Hardness-calc.[3]	1	mg/L	172	107	149	66	548	17
Hardness-titr.[3]	10	mg/L	146	82	140	30	390	17
SAR	0.0001	units	0.995	0.800	0.830	0.319	3.81	17
Settleable Solids	0.1	mg/L	2	3	1	<0.1	9	11
TDS	20	mg/L	229	79	220	120	430	17
TSS	4	mg/L	1799	4188	110	7	17000	17
Turbidity	0.05	NTU	780	1418	70	4.4	4800	17

1. Mean, standard deviation, and median computed using values of one-half MDL for non-detects.

2. Number of analyses greater than the MDL; total analyses = 17.

3. Hardness in $CaCO_3$ equivalent.

Source: SRK, 1996e.

APPENDIX H

SOILS AND PLANT ASSOCIATIONS

This appendix was excerpted from the following document: U.S. Forest Service. 1991. Kensington Gold Project, Draft Environmental Impact Statement.

H. SOILS AND PLANT ASSOCIATIONS

GENERAL SOIL PROPERTIES

The soils of the study area have been strongly influenced by an extensive history of glaciation that has occurred throughout Southeast Alaska. As a result, all of the soils are very young with respect to the normal processes of soils genesis.

On a national scale, the unique feature of the soils in Southeast Alaska is the predominance of organic soils. The dominant soils are Humic Cryorthods. On a regional scale, the soils of the study area are characterized as very porous and friable, and extremely acidic, except in the lowest horizons that overlie calcareous bedrock.

The typical chemical and physical properties of the soils on the Tongass National Forest have been summarized by the Forest Service (USFS, 1969). Representative data for the major soil types are presented in Table H-1, Chemical and Physical properties of Tongass Area Soils. Management implications for these soils are summarized in Table H-2, Management Interpretations of Tongass Area Soils. This comparison suggests that most soils have a low susceptibility to induced sediment production.

Intensive mapping of all of the soils on the Tongass National Forest was completed during 1990. (See Figure H-1, Soils Map.) The Kensington soils study area is defined as the area between Lynn Canal and Berners Bay and Berners River north to an east west cutoff approximately 2 miles north of Lions Head Mountain. An Order 4 level of soils survey was conducted for this area by the Forest Service (USFS, 1990). This survey is of sufficient detail to facilitate broad planning decisions. The soils study area encompasses a total of 47 mapping units that have been delineated. A listing of these soil mapping units is presented in Table H-3, Kensington Area Soil Mapping Units. These soil map units contain a total of 43 soil types. (See Table H-4, Soil Type Acreages in the Kensington Study Area). Excluding miscellaneous land types such as rock outcrop, glaciers, and water the study area contains a total of 29,131 acres of taxonomically identifiable soils. Mineral soils account for 61.8 percent of the study area and organic soils account for 29.2 percent of the area. A description of the major soil types present in the study area follows. Further discussion can be found in the Kensington Soils Technical Report (ACZ, 1991b).

Soil Sampling

Representative samples of several soil and mine soil materials were collected and analyzed within the Kensington study area in order to characterize the properties of the soils materials. Site-specific sampling and measurements of the soils within the Kensington study area was conducted on numerous sites within potential development areas including Sherman

Table H-1. Chemical and Physical Properties of Tongass Area Soils

Horizon	pH	Carbon (%)	Total N (%)	C/N Ratio	Available P (ppm)	Ext. CEC (meq/100g)	Ext. Ca (meq/100g)	Ext. Mg (meq/100g)	Ext. K (meq/100g)	Ext. Na (meq/100g)	Base Saturation (%)	Free Iron (%)	Bulk Density (g/cc)	Saturation (%)	Physical Properties % 1/3 Bar Moisture	Physical Properties % 15 Bar Moisture
Freely Drained Type F1 Soils at least 10-Inches deep																
0	3.6	--	1.50	--	4.5	115	8.1	8.1	0.8	1.5	16	0.11	--	--	--	--
A2	4.1	5.0	0.20	26	3.5	26	1.0	0.8	0.1	0.2	9	1.1	1.02	--	--	14
B21	4.2	9.2	0.49	19	1.7	59	0.6	0.9	0.2	0.9	5	4.5	0.64	--	--	27
B24	4.7	5.3	0.21	25	2.9	30	0.7	0.3	0.2	0.6	7	4.0	0.69	72	47	30
B3	4.9	3.5	0.16	26	2.6	22	0.4	0.2	0.1	0.5	6	3.0	0.64	--	--	22
Freely-Drained Type F2r Soils (McGilvery Soils) 0 to 2 Inches to bedrock																
0	3.4	--	0.88	--	--	112	8.4	5.6	1.9	1.8	14	--	0.12	--	31	27
Deep Freely-Drained Type F3a Soils From Sandy Volcanic Ash																
0	3.6	51	0.77	65	--	145	8.0	15	1.0	1.5	--	0.2	0.17	--	--	39
A2	4.1	5.1	0.08	61	--	12	0.3	0.4	0.1	0.1	--	0.3	0.86	--	45	--
B21	4.2	18.1	0.44	41	--	59	0.5	0.4	0.1	0.2	--	1.1	0.37	--	--	44
B22	4.5	17.3	0.34	51	--	27	0.2	0.2	0.1	0.3	--	0.4	0.30	--	77	48
B3	5.5	4.3	0.14	31	--	60	0.3	0.1	0.0	0.1	--	--	0.24	--	81	--
Somewhat Poorly-Drained Soils Over Compact Till Type F4c Soils																
0	3.8	--	1.07	--	42	100	16.3	5.8	2.8	1.5	28	0.1	--	--	--	--
A2	4.8	0.9	0.09	10	0	16	1.0	0.4	0.1	0.1	10	0.1	--	--	--	--
B2	4.8	2.6	0.14	19	2.5	23	1.2	0.4	0.2	0.2	9	0.5	--	--	--	--
B3	5.0	1.7	0.10	17	2.8	22	1.0	0.3	0.1	0.3	8	0.3	--	--	--	--
Poorly Drained Type F5 Soils																
0	3.5	--	0.91	--	--	103	9.3	3.7	1.1	0.8	15	--	--	--	--	--
Alpine Soils Type A1 Soils																
0-7"	5.1	38.8	1.45	23	--	68	0.5	1.9	0.6	0.6	4	6.7	0.35	--	--	76
7-11"	4.6	13.3	0.65	20	--	49	0.2	0.7	0.1	0.2	2	4.1	0.66	--	--	61

N = Nitrogen; C/N = Carbon / Nitrogen; P = Phosphorus; Ext. = Extractable; CEC = Cation Exchange Capacity; Ca = Calcium; Mg = Magnesium; K = Potassium; Na = Sodium

Table H-2. Management Interpretations of Tongass Area Soils

	Susceptibility to Induced Sediment Production	Landslide Hazard	Depth to Seasonal Saturation Level (ft)	Compactibility	Usual Depth to Bedrock (ft)	Usual Road Construction Problems
Alpine Health Soils (A1)	low to moderate	low to moderate	0 - 3	high	2 - 5	cutbank erosion
Alpine Sedge Soils (A2)	very low to low	very low	0	high	2 - 6	wetness, cutbank erosion
Brushy Snowslide Soils (B)	high	moderate	1 - 3	moderate	1 - 6	cutbank failure, avalanches
Tide Influenced Soils	low	very low	0	low	6+	flooding
Deep, freely-drained young alluvial terrace soils (f1t)	moderate	very low	1 - 3	moderate	6+	flooding
Freely-drained soils at least 10-inches deep (F1)	moderate-high	low to high	1 - 3	moderate	1 - 6	cutbank failure, landslides
Freely-drained soils less than 10-inches deep (McGilvery soils)	low	low	1/2 - 3+	low	0 - 1/2	rock
Deep, freely-drained soils (F3)	low	low	3+	moderate	6+	few
Somewhat poorly-drained soils (F4)	low	very low	1/2 - 1	moderate	6+	few
Poorly-drained soils (F5)	low	very low - low	1/2	high	4 - 6+	wetness, cutbank failure
Somewhat poorly-drained soils of high elevations (F6)	low - high	low-high	1/2 - 1	moderate	1/2 - 3	rock, wetness
Poorly-drained organic soils of high elevations (F7)	high	high	0	high	1/2 - 3	rock, wetness
Free drained soils - Sitka spruce (Fx)	variable	variable	2 - 3+	moderate	1/2 - 6+	rock, cutbank failure
Ice	very low	--	--	--	6+	ice
Sphagnum muskeg (M1)	very low	very low	0	high	6+	wetness
Sedge-slope muskeg (M2)	very low - low	low	0	high	4-10+	wetness, cutbank failure
Rock (R)	very low	low	--	low	0	rock
Erosion V-notch Escarpments (V)	very high	very high	variable	moderate	variable	severe cutbank failure, avalanches, landslides

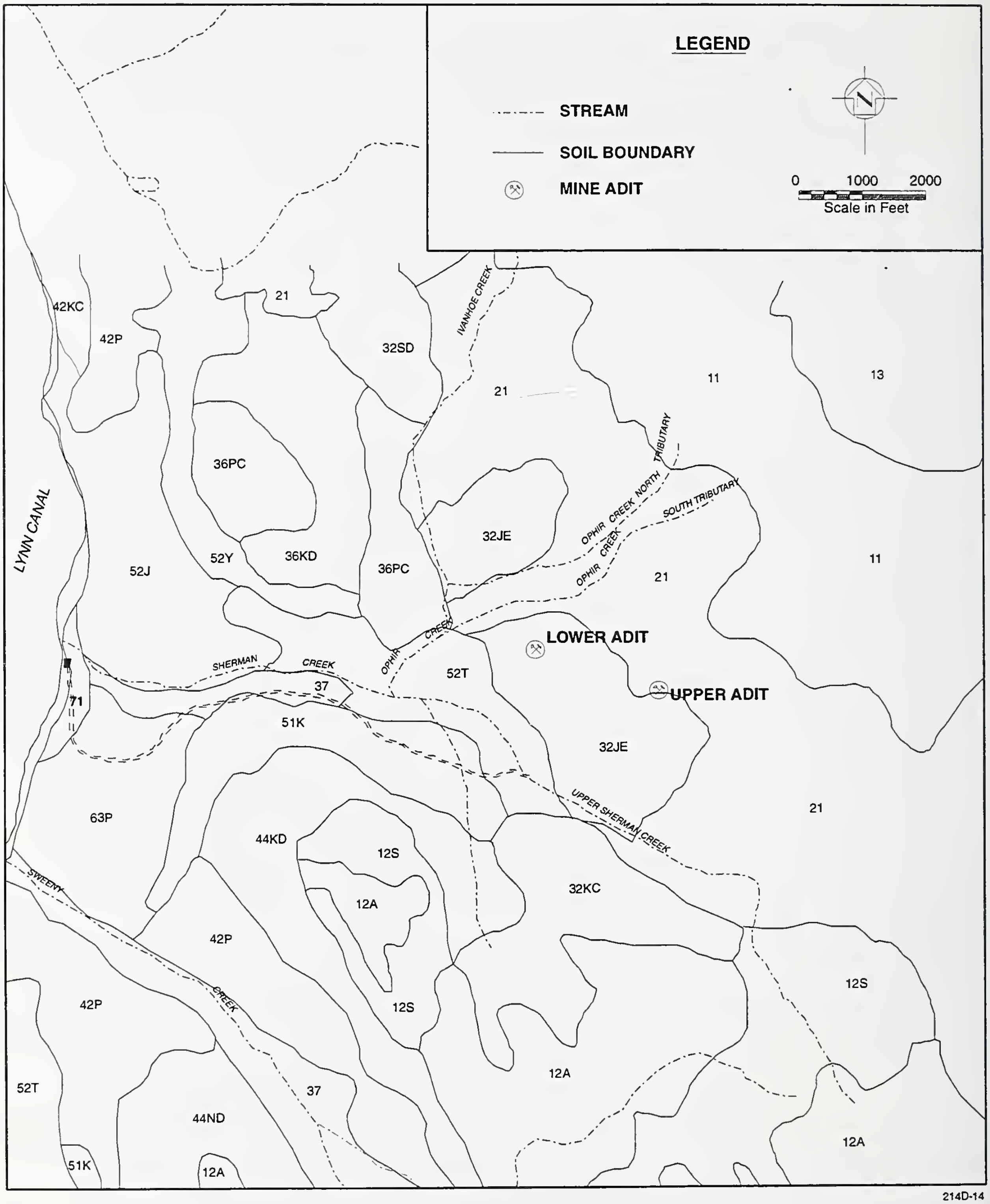

Figure H-1. Soils Map

Table H-3. Kensington Area Soil Mapping Units

Soil Mapping Unit Key			
11	Rock Outcrop - Lithic Cryorthents	42P	Lithic Cryosaprists - Lithic Cryaquods
12A	Lithic Cryosaprists, Cold - Rock Outcrop	42T	Lithic Cryosaprists
12S	Spodosols, Cold - Lithic Cryosaprist, Cold	44JC	Humic Cryorthods - Typic Cryorthods
13	Glaciers	44JE	Humic Cryorthods - McGilvery
21	Entic Cryumbrepts - Lithic Cryorthents	44KC	Typic Cryaquods - Humic Cryorthods
32JC	Humic Cryorthods - Typic Cryorthods	44KD	Typic Cryaquods - Humic Cryorthods - McGilvery
32JD	Humic Cryorthods - McGilvery 56 to 75 percent slope	44ND	McGilvery - Humic Lithic Cryorthods - Humic Cryorthods
32JE	Humic Cryorthods McGilvery 76 to 120 percent slope	44NE	McGilvery - Humic Lithic Cryorthods
32KC	Typic Cryaquods - Humic Cryorthods	44PC	Lithic Cryaquods - Lithic Cryaquods
32ND	McGilvery - Humic Lithic Cryorthods - Humic Cryorthods	51J	Humic Cryorthods
32SD	Spodosols - McGilvery 56 to 76 percent slope	51K	Humic Cryorthods - Typic Cryaquods
32SE	Spodosols - McGilvery 76 to 140 percent slope	52J	Humic Cryorthods
35JD	Humic Cryorthods - McGilvery	52T	Cryohemists - Typic Cryaquods
35KD	Typic Cryaquods - Humic Cryorthods - McGilvery	52Y	Cryorthods - Cryofluvents
35ND	McGilvery - Humic Lithic Cryorthods - Humic Cryorthods	53M	Cryofibrists
35NE	McGilvery - Humic Lithic Cryorthods	53Y	Cryorthods - Cryofluvents
35SD	Spodosols - McGilvery	61T	Crohemists - Typic Cryaquods
36KD	Typic Cryaquods - Humic Cryorthods	62M	Crohemists
36ND	McGilvery - Humic Lithic Cryorthods - Humic Cryorthods	62T	Crohemists - Cryosaprists
36NE	McGilvery - Humic Lithic Cryorthods	63P	Cryosaprists - Histic Cryaquepts
36PC	Lithic Cryosaprists - Lithic Cryaquods	63T	Cohemists - Typic Cryaquods
36SD	Spodosols - McGilvery	71	Cryaquepts - Typic Cryaquents
37	Entic Cryumbrepts - McGilvery - Rock Outcrop	74E	Typic Cryopsamments - Typic Cryorthods Mixed
42KC	Typic Cryaquods - Humic Cryorthods	W	Fresh Water
42KD	Typic Cryaquods - Humic Cryorthents - McGilvery		

Notes:

Not all listed soils mapping units exist in the study area, but are shown in the Kensington Soils Technical Report (ACZ, 1991b).

The soil mapping unit key provided with the digitized soil maps lists unit 12A as Lithic Cryorthents, Cold - Rock Outcrop; and 35KD as Typic Cryorthods - McGilvery.

Table H-4. Soil Type Acreages in the Kensington Study Area

Soil Type	Acres
Humic Cryorthods	3,525.4
Lithic Cryosaprists, cold	3,149.6
Typic Cryaquods	2,668.5
Cryohemists	2,475.5
Entic Cryumbrepts	2,322.4
Lithic Cryorthents	1,897.0
McGilvery	1,887.4
Cryofibrists	1,820.1
Lithic Cryorthents	1,728.2
Spodosols	1,408.7
Cryosaprists	989.2
Lithic Cryaquods	920.4
Spodosols, cold	919.2
Humic Lithic Cryorthods	709.7
Sphagnofibrists	630.2
Histic Lithic Cryaquepts	446.0
Histic Cryaquepts	403.4
Typic Cryorthods	334.3
Cryaquepts	175.9
Histisols	174.0
Cryaquods	156.6
Cryofluvents	136.3
Typic Cryaquepts	79.7
Cryorthods	50.0
Typic Cryosaprists	19.1
Cryaquents	45.0
Aquic Cryofluvents	27.8
Typic Eryopsamments	25.1
Cryochrepts	3.2
Hydraquents	3.2

Creek basin, Sweeny Creek basin, and along the proposed Berners Bay access road (Alternative C). Results of these evaluations are presented in Table H-5, Kensington Soil Materials Chemical and Physical Properties. The hazardous waste characteristics of these same samples are summarized in Table H-6, Kensington Soil Materials EP Toxicity Analyses.

Humic Cryorthods

This soil type is the most extensive in the study area covering 3,525 acres or 10.1 percent of the area. It is a component of 20 of the 47 soil map units. This soil is developed on volcanic ash, colluvium, and ablation till parent material; is found on all landscape positions; has a soil drainage class of moderately well to well drained; a permeability class of rapid; and a moderately deep to very deep soil depth. These soils are characterized by well developed mineral horizons and moderately thick (5 to 7 inches) surface organic layers. Soils in this type occupy stable mountain slopes and foot slope intervals which are not associated with disturbance by concentrated surface or subsurface water flow.

Plant associations found on this soil type include the Western Hemlock / Blueberry / Shield Fern, Western Hemlock / Blueberry - Devil's Club, and Western Hemlock / Blueberry habitat types. The most productive Hemlock forests found on the Tongass are supported on these soils.

Lithic Cryosarprists, Cold

This organic soil type covers 3,149.6 acres or 9.1 percent of the study area and is a component of 2 of the 47 soil mapping units. This soil has developed on either mineral or organic material and is typically found on bedrock knobs and on plateaus. It has a drainage class of very poorly drained; a permeability class of moderately slow to moderately rapid; and a soil depth that is generally shallow.

Plant associations found on this soil are Mountain Hemlock / Blueberry Mertens Cassiope and Alpine Shrubland / Emergent Muskeg habitat types.

Typic Cryaquods

This soil type covers 2,668.5 acres or 7.7 percent of the study area and is found as a component of 16 of the 47 soil mapping units. This soil has developed on colluvium, compact till, or ablation till parent materials and is typically found on the lower third of moderately steep slopes. It has a soil drainage class of poorly to somewhat poorly drained; a permeability class of moderately rapid; and has moderately deep to very deep soil depths. These soils are classified as mineral, and on gentler slopes, are deep and somewhat poorly drained. On the steeper slopes soil depth decreases and drainage improves.

Plant associations associated with these soils are the Western Hemlock / Blueberry, Western Hemlock / Blueberry - Devil's Club, and Mixed Conifer / Blueberry habitat types.

Table H-5. Kensington Soil Materials Chemical and Physical Properties

Material	pH	EC (mmhos/cm)	Sat %	Sol. Ca (meg/l)	Sol. Mg (meg/l)	Sol. Na (meg/l)	SAR	Exc. Ca (meg/100g)	Exc. Mg (meg/100g)	Exc. Na (meg/100g)	NO_3-N (mg/kg)	Ext. P (mg/kg)	Ext. K (mg/kg)	Ext. Cu (mg/kg)
Peat	4.8	1.12	136	0.24	0.70	7.33	10.7	2.1	2.64	2.94	-0.1	10.0	280	15.1
Glacial Till	5.2	0.48	70	0.18	0.12	2.85	7.4	0.36	0.53	0.71	-0.1	-0.5	60	9.2
Fresh Ore	7.8	3.46	22	29.70	6.03	8.28	2.0	20.8	0.26	0.26	16.9	1.3	32	1.2
Fresh Waste Rock	8.1	4.14	22	14.13	6.14	20.31	6.4	19.4	0.39	0.63	16.1	-0.5	58	1.3
Weathered Ore	7.8	2.38	21	18.92	5.83	4.61	1.3	22.6	0.27	0.19	16.8	-0.5	23	2.0
Weathered Waste Ore	8.3	1.11	27	6.20	1.93	2.67	1.3	25.0	0.16	0.18	5.4	-0.5	23	2.0
Old Kensington Mine Waste Rock	8.0	1.37	20	2.34	1.41	8.23	6.0	19.6	0.44	.40	3.6	-0.5	45	7.7
Old Mill Ore	7.7	1.63	21	9.26	3.76	2.07	0.8	13.3	0.36	0.12	0.1	1.6	51	6.4
Surface Waste Rock Exposure	7.7	.70	23	1.45	0.84	2.96	2.8	1.2	0.10	0.23	-0.2	2.6	43	4.5
Surface Ore Exposure	6.9	1.99	25	21.52	1.33	1.83	0.5	6.1	0.03	0.15	-0.1	2.2	19	0.8
Tailings - 1	7.9	3.65	29	25.5	1.36	5.60	1.5	27.5	0.03	-0.03	0.6	-0.1	70	12.7
Tailings - 2	7.7	3.30	31	21.69	2.47	8.57	2.5	--	--	--	5.0	--	30	8.5
Tailings - 3	7.7	3.24	30	24.53	2.91	10.15	2.7	--	--	--	2.0	--	30	8.9

Exc. = Exchangeable; Mo = Molybdenum; Ni = Nickel; Zn = Zinc; Sol. = Soluble; Se = Selenium; S = Sulfur; Neut. Pot. = Neutralizing Potential; $CaCo_3$ = Calcium Carbonate;
ABP = Acid Buffering Potential.
Note: Negative sign (-) denotes less than.

Table H-5. Kensington Soil Materials Chemical and Physical Properties (continued)

Material	Exc. Fe (mg/kg)	Exc. Mn (mg/kg)	Exc. Mo (mg/kg)	Exc. Ni (mg/kg)	Exc. Zn (mg/kg)	Sol. Se (mg/kg)	% Organic S	% Pyrite S	% Sulfate S	% Total S	Neut. Pot. (% $CaCO_3$)	ABP (tons/ 1,000 T)	% Sand	% Silt	% Clay	Texture
Peat	525	11.9	0.5	2.3	35	-0.01	0.06	-0.01	-0.01	0.06	-0.7	-0.9	54	33	14	SL
Glacial Till	548	11.9	0.5	0.6	7.5	0.01	0.02	-0.01	-0.01	0.02	-0.4	-5	73	5	23	SCL
Fresh Ore	34	6.7	-0.5	-0.2	0.4	-0.01	2.07	0.19	-0.01	2.36	4.7	-24	84	11	5	LS
Fresh Waste Rock	53	7.6	-0.5	-0.2	0.7	0.01	0.19	0.04	0.07	0.30	3.9	30	84	10	6	LS
Weathered Ore	35	6.2	-0.5	-0.2	0.3	0.01	0.67	0.22	0.05	0.94	4.6	17	80	15	5	LS
Weathered Waste Ore	51	8.2	-0.5	-0.2	0.4	-0.01	0.11	0.03	0.03	0.17	4.1	36	81	14	5	LS
Old Kensington Mine Waste Rock	54	7.3	-0.5	-0.2	1.0	0.02	0.15	-0.01	-0.01	0.15	3.3	28	86	5	9	S
Old Mill Ore	58	13.3	-0.5	-0.2	0.4	0.01	0.63	1.12	0.01	1.75	4.4	-11	86	9	5	S
Surface Waste Rock Exposure	52	11.8	-0.5	-0.2	0.4	-0.01	0.04	0.03	0.01	0.08	0.4	2	83	14	4	LS
Surface Ore Exposure	64	6.4	-0.5	-0.2	0.2	0.02	2.37	0.45	0.68	3.50	0.4	-105	84	13	4	LS
Tailings - 1	88.4	12.0	-0.5	0.5	1.1	-0.03	0.11	0.74	0.12	0.97	9.1	61	39	52	9	SiL
Tailings - 2	89	6.0	-0.5	0.4	0.5	-0.005	0.03	0.64	0.31	0.98	12.3	--	46	44	10	L
Tailings - 3	86	5.4	-0.5	0.5	0.5	-0.005	0.03	0.94	-0.01	0.97	12.8	--	46	45	9	L

Exc. = Exchangeable; Mo = Molybdenum; Ni = Nickel; Zn = Zinc; Sol. = Soluble; Se = Selenium; S = Sulfur; Neut. Pot. = Neutralizing Potential; $CaCo_3$ = Calcium Carbonate;
ABP = Acid Buffering Potential.
Note: Negative sign (-) denotes less than.

Table H-6. Kensington Soil Material EP Toxicity Analyses (mg/L)

Material	Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
Peat	0.002	0.36	-0.005	-0.01	-0.02	-0.0001	0.002	-0.01
Glacial Till	-0.001	0.43	-0.005	-0.01	0.02	-0.0001	-0.002	-0.01
Fresh Ore	0.001	0.21	-0.005	-0.01	-0.02	-0.0001	-0.002	-0.01
Fresh Waste Rock	0.001	0.07	-0.005	-0.01	-0.02	-0.0001	0.002	-0.01
Weathered Ore	0.002	0.47	-0.005	-0.01	-0.02	0.0002	-0.002	-0.01
Weathered Waste Rock	0.001	0.14	-0.005	-0.01	-0.02	-0.0001	-0.002	-0.01
Old Kensington Mine Waste Rock	0.001	0.48	-0.005	-0.01	-0.02	-0.0001	-0.002	-0.01
Old Mill Ore	0.001	0.41	-0.005	-0.01	-0.02	-0.0001	-0.002	-0.01
Surface Waste Rock Exposure	0.002	0.05	-0.005	-0.01	-0.02	-0.0001	-0.002	-0.01
Surface Ore Exposure	0.001	0.16	-0.005	-0.01	-0.02	-0.0001	-0.002	-0.01
Tailings - 1	-0.001	0.57	-0.005	-0.01	0.03	-0.0002	-0.005	-0.01
Tailings - 2	-0.200	0.81	-0.005	-0.01	0.03	-0.0002	-0.02	-0.01
Tailings - 3	-0.200	0.63	-0.005	-0.01	0.03	-0.0002	-0.02	0.03
Suspect Level	≥5.0	≥100.0	≥1.0	≥5.0	≥5.0	≥0.2	≥1.0	≥5.0

Cryohemists

This soil type covers 2,475.5 acres or 7.1 percent of the study area and is found as a component of 7 of the 47 soil mapping units. These soils have developed on organic parent materials, and occupy nearly level sites on gentle slopes or depressions in the lower portions of the mapping unit. They have a soil drainage class of very poorly drained; a permeability class of moderately slow to moderately rapid; and very deep soil depths. These soils are most extensive on lowlands and broad valley bottoms.

Plant associations found on these soils are the Tufted Club Rush / Bog Kalima, Mixed Conifer / Blueberry / Skunk Cabbage, and Mixed Conifer / Blueberry / Deer Cabbage habitat types.

Entic Cryumbrepts

This soil type covers 2,322.4 acres or 6.7 percent of the study area and is found as a component of 12 of the 47 soil mapping units. These soils occupy the lower slopes of the mapping units and have developed largely on colluvium parent materials; they have a soil drainage class of moderately well drained; a permeability class of moderately rapid; and soil depths of moderately deep to deep. These soils occur on floodplains and similar areas with low slope gradients and on steep mountain slopes where the soil is shallow and rock outcrops are common. The soils are mineral and are often disturbed by periodic surface and subsurface water flows. These soils are generally considered to be moderately productive with respect to their timber potential.

Plant associations found on these soils include the Alder-Salmonberry, Alder / Lady Fern, and the Western Hemlock / Blueberry - Devil's Club habitat types.

Lithe Cryosaprists

This soil type covers 1,897 acres or 5.5 percent of the study area and is found as a component of 15 of the 47 soil mapping units. These soils have developed on organic parent materials and occupy all landscape positions on broken mountain slopes and hillsides below the subalpine zone on nearly level sites. They are most extensive on lowlands and broad valley bottoms and commonly occur near sites occupied by muskeg. These soils have a soil drainage class of very poorly drained; a permeability class of moderately rapid; and soil depths of very shallow to moderately deep.

Plant associations found on these soils include the Mixed Conifer / Blueberry / Deer Cabbage, Mixed Conifer / Blueberry, and Mixed Conifer / Blueberry - Copperbush habitat types.

McGilvery

This soil type covers 1,887.4 acres or 5.4 percent of the study area and is the most widespread soil type found in the study. It occurs in 23 of the 47 soil mapping units. These soils occupy shoulder slopes and upper slopes on the mountains at all elevations below the subalpine zone. They typically have a soil drainage class of well drained; a moderately rapid permeability class; soil depths ranging from very shallow to shallow over bedrock; and have developed on organic parent materials.

Plant associations found on these soils include the Western Hemlock / Blueberry, Western Hemlock - Yellow Cedar / Blueberry, and Mixed Conifer / Blueberry habitat types.

Cryofibrists

This soil type covers 1,820.1 acres or 5.2 percent of the study area and is associated with only 2 of the 47 soils mapping units. These soils have developed from organic parent materials and are typically found on areas with very low slope gradients such as in old oxbows and in slack water overflow channels near the river floodplains and terraces. They have a drainage class of very poorly drained; a very rapid permeability class; and soil depths ranging from moderately deep to very deep.

Plant associations with this type include the Alder-Salmonberry, Emergent Tall Sedge Muskeg, and the Emergent Mixed Forb / Grassland habitat types.

Lithic Cryorthents

This soil type covers 1,728.2 acres or 5.0 percent of the study area and is found on 2 of the 47 soils mapping units. These soils have developed on colluvium and residuum parent materials and usually are found on moderately steep to very steep slopes and benches knobs near the rugged mountainous summits. These soils typically have a soil drainage class of moderately

well to well drained; a moderately rapid permeability class; and shallow to very shallow soil depths over bedrock. This type is the most extensive alpine soil type found in Southeast Alaska.

Plant associations associated with these soils include the nonforested Alpine Lichen - Rock Outcrop and Alpine Meadow habitat types.

Spodosols

This soil type covers 1,408.7 acres or 4.1 percent of the study area and is found on 5 of the 47 soils mapping units. These soils have developed on residuum ablation till, and colluvium parent materials and are typically found on all landscape positions from smooth to frequently dissected and shallow incised mountain slopes. They occur at all elevations below the subalpine zone. These soils usually have poorly to well drained drainage classes; moderately rapid permeability; and soil depths ranging from very shallow to deep. These soils are deep and somewhat poorly drained on gentler slopes and become shallower and better drained as the slope gradient increases. This soil type is not disturbed by erosion, flooding, or subsurface groundwater flow.

Plant associations normally found on these soils include the Western Hemlock / Blueberry and Mountain Hemlock / Blueberry / False Hellebore habitat types. These soils are moderately productive with respect to their timber production potential.

PLANT ASSOCIATIONS

The vegetation of southeastern Alaska has been described as a coastal rain forest due to the proliferation of plant growth that occurs in this area. The dominant vegetation type found is a coniferous forest. This type is comprised of several tree species. The most common forest type found in the region is the Coastal Spruce - Hemlock Forest (USFS, 1972). The Forest Service has prepared a Tongass National Forest Type Map which was used as the basis for the vegetation map of the study area (See Figure H-2, Vegetation Map and Table H-7, Kensington Area Vegetation Mapping Units). The plant communities delineated in this mapping effort and associated acreages are presented on Table H-8, Forest Type Acreages in the Kensington Study Area. The following sections present a discussion of specific plant associations within the communities.

Extensive ecological characterization efforts have documented that climax or near climax plant communities possess certain indicator vegetation species that can be used to classify habitat types according to certain soil types. A plant association classification system for the Tongass National Forest has been developed (Martin et al., 1985) which has been correlated to the recent soils mapping information. In the following discussion, plant associations found on 97.6 percent of the study area are described. The remaining 2.4 percent of the area is comprised of eight

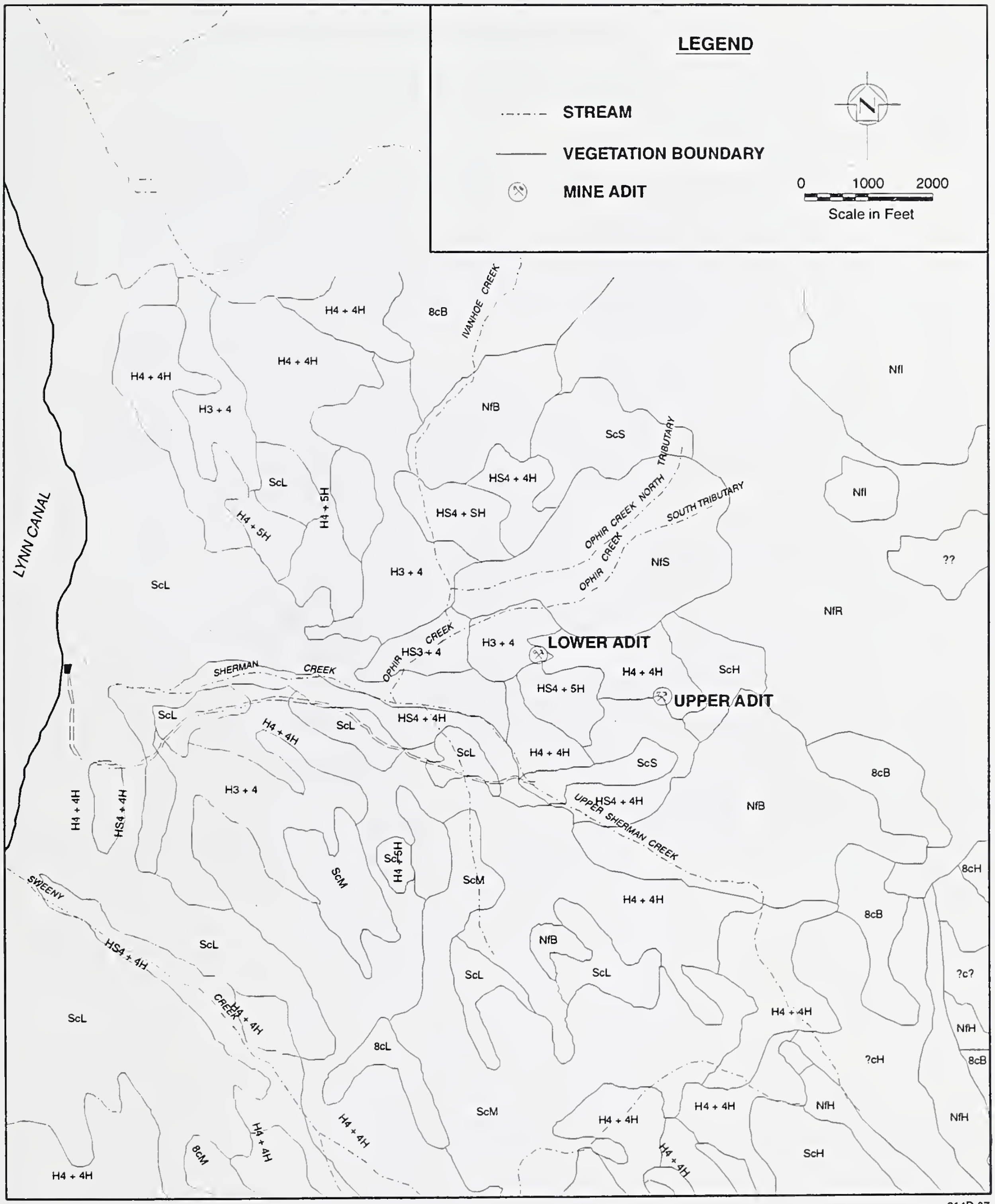

Figure H-2. Vegetation Map

Table H-7. Kensington Area Vegetation Mapping Units

Forest Service Vegetation Mapping Unit Types	
	Hemlock - Spruce
H2S +	Poletimber; Well Stocked
HS3 + 4	Youth - Growth Sawtimber; Well Stocked; 8 to 20 MMBD
HS4 = 4H	Old - Growth Sawtimber; Medium Stocking; 8 to 20 MMBD; High Decadence Risk
HS4 = 5H	Old - Growth Sawtimber; Medium Stocking; 20 to 30 MMBD; High Decadence Risk
HS4 + 4H	Old - Growth Sawtimber; Well Stocked; 8 to 20 MMBD; High Decadence Risk
HS4 + 5H	Old - Growth Sawtimber; Well Stocked; 20 to 30 MMBD; High Decadence Risk
HS4 + 4L	Old - Growth Sawtimber; Well Stocked; 8 to 30 MMBD; Low Decadence Risk
HS4 + 5L	Old - Growth Sawtimber; Well Stocked; 20 to 30 MMBD; Low Decadence Risk
	Black Cottonwood
P2 =	Black Cottonwood; Medium Stocking
P3 = 4	Black Cottonwood; Medium Stocking; 8 to 20 MMBD
P3 = 4H	Black Cottonwood; Medium Stocking; 8 to 20 MMBD; High Decadence Risk
	Spruce
S2 -	Poletimber; Poorly Stocked
S2 =	Poletimber; Medium Stocking
S2 +	Poletimber; Well Stocked
S3 = 4	Youth - Growth Sawtimber; Medium Stocking; 8 to 20 MMBD
S3 + 4	Youth - Growth Sawtimber; Well stocked; 8 to 20 MMBD
S4 + 4H	Old - Growth Sawtimber; Well Stocked; 8 to 20 MMBD; High Decadence Risk
S4 + 5H	Old - Growth Sawtimber; Well Stocked; 8 to 20 MMBD; Low Decadence Risk
	Spruce (continued)
S4 = 5H	Old - Growth Sawtimber; Medium Stocking; 8 to 20 MMBD; High Decadence Risk
S4 + 6H	Old - Growth Sawtimber; Well Stocked; 8 to 20 MMBD; High Decadence Risk
	Hemlock
H3 + 4	Young - Growth Sawtimber; Well Stocked; 8 to 20 MMBD
H3 = 4H	Old - Growth Sawtimber; Medium/Well Stocked; 8 to 20 MMBD
H4 + 4H	Old - Growth Sawtimber; Well Stocked; 8 to 20 MMBD; High Decadence Risk
H4 + 4L	Old - Growth Sawtimber; Well Stocked; 8 to 20 MMBD; Low Decadence Risk
H4 + 5H	Old - Growth Sawtimber; Well Stocked; 20 to 30 MMBD; High Decadence Risk
H4 + 6H	Old - Growth Sawtimber; Well Stocked; 30 to 50 MMBD; High Decadence Risk
	Unproductive Forest Classes
ScR	Rock
ScL	Low Site
ScM	Muskeg
ScH	High Elevation
ScS	Recurrent Slide Zone
	Nonforest Classes
NfG	Natural Grassland
NfB	Brush (Other Than Alder)
NfS	Recurrent Snow Slide Zone
NfH	Alpine (High Meadow)
NfR	Rock
NfI	Ice or Snow Fields
NfM	Muskeg Meadows

Table H-8. Forest Type Acreage in the Kensington Study Area

Map Symbol	Forest Type	Acres
ScL	Low site	6,530
H4 +4H	Hemlock; old growth sawtimber; well stocked; 8-20 MMBD; high decadence risk	4,883
NfR	Rock	3,696
ScM	Muskeg Forest	2,481
NfI	Ice or smow fields	2,227
HS4 + 4H	Hemlock-spruce; old growth sawtimber; well stocked 8-20 MMBD; high decadence risk	2,037
NfB	Brush (other than alder)	1,658
NfS	Recurrent snow slide zone	1,403
HS4 + 5H	Hemlock-Spruce; old growth sawtimber; medium stocking; 20-30 MMBD; high decadence risk	1,236
ScS	Hemlock-Spruce; old growth sawtimber; medium stocking; 20-20 MMBD; high decadence risk	1,236
H4 + 5H	Hemlock; old growth sawtimber; well stocked; 20-30 MMBD high decadence risk	1,181
NfG	Natural grassland	870
ScH	High elevation (Alpine)	777
NfH	Alpine (high meadow)	683
H4 = H4	Hemlock; old growth sawtimber; medium stocking; 8-20 MMBD	420
HS3 +4	Hemlock-Spruce; young growth sawtimber; well stocked; 8-20 MMBD	398
H3 + 4	Hemlock; young growth sawtimber; well stocked; 8-20 MMBD	373
HS4 + 4L	Hemlock-Spruce; old growth sawtimber; well stocked; 8-20 MMBD; low decadence risk	355
P4 = 4H	Black Cottonwood; medium 8-20 MMBD; high decadence risk	320
HS4 = 4H	Hemlock-Spruce; old growth sawtimber; medium stocked; 8-20 MMBD; high decadence risk	261
W	Water	199
HS4 + 5L	Hemlock-Spruce; old growth sawtimber; well stocked; 20-30 MMBD; low decadence risk	177
ScR	Rock	131
H4 + 4L	Hemlock-Spruce; old growth sawtimber; well stocked; 8-20 MMBD; low decadence risk	129
S3 = 4	Spruce; young growth sawtimber; medium stocking; 8-20 MMBD	109
P3 = 4	Black cottonwood; medium stocking; 8-20 MMBD	87
S4 + 4H	Spruce; old growth sawtimber; well stocked; 8-20 MMBD; high decadence risk	64
S4 + 6H	Spruce; old growth sawtimber; well stocked; 30-50 MMBD; high decadence risk	60
S3 + 4	Spruce; young growth sawtimber; well stocked; 8-20 MMBD	58
HS2 +	Hemlock-Spruce; pole timber; well stocked	47
S2 +	Spruce; pole timber; well stocked	38
NfM	Muskeg Meadow	29
S2 -	Spruce; pole timber; poorly stocked	22
S2 =	Spruce; pole timber; medium stocking	18
P2 =	Black Cottonwood; medium stocking	10

smaller types, three Sitka spruce subtypes, open water, and four small nonforested types. (See Table H-9, Plant Associations in the Kensington Study Area). Table H-10, Forest Plant Associations by Soil Type, correlates study area plant associations with soil mapping units. Table H-11, Kensington Wetlands Functions and Values, provides an evaluation of wetland plant associations based on the system recommended by Adamus Resource Assessment, Inc. (1987b).

Alder - Salmonberry

This nonforested shrubland plant association is the most extensive habitat type within the study area. It covers 4,372 acres or 12.6 percent of the study area and occurs on three soils mapping units. This type is dominated by Sitka alder which generally provide greater than 70 percent cover. Salmonberry, stink currant (*Ribes bracteosum*), and devil's club are common. Dominant understory species are lady fern (*Athyrium filix femina*), oak fern (*Gymnocarpium dryopteris*), twisted stalk (*Streptopus* spp.) and stream violet (*Viola glabella*). This plant community usually occurs on floodplains with low slope gradients. It is considered by the Forest Service to be an upland type but five of the eight dominant plant species have wetland indicator status.

Alpine Shrubland / Emergent Muskeg

This nonforested shrubland plant association is the second most extensive in the study area. It covers 4,354.8 acres or 12.6 percent and occurs on three different soils mapping units. This habitat type occupies areas of poorly drained soils and is dominated by Cassiope (*Cassiope spp.),* yellow mountain heather (*Phyllodoce glandulifera*), and copperbush (*Clodothamnus pryolaeflorus*). The emergent muskeg portion is characterized by sedges. This type is considered to be a wetland plant community.

Western Hemlock / Blueberry

This forested plant association covers 3,212.4 acres or 9.0 percent of the study area and is found on 24 different soil mapping unit areas. Medium-sized western hemlock dominate the overstory, and blueberry and rusty menziesia dominate the shrub layer, while the herb layer is dominated by bunchberry and five leaf bramble. This habitat type occurs at all elevations below the subalpine zone. This habitat is considered upland.

Alpine Lichen - Rock Outcrop

This nonforested plant association covers 2,609.1 acres or 7.6 percent of the study area and is found on two different soil mapping units. This type occupies the highest elevations above timberline. Plant cover generally does not exceed 50 percent but species diversity is high. Vegetation is dominated by low growing alpine sedges. There are also minor amounts of deer cabbage and sphagnum moss. This habitat type is considered upland.

Table H-9. Plant Associations in the Kensington Study Area

Plant Association	Acres
Alder - Salmonberry	4,372.0
Alpine Shrubland / Emergent Muskeg	4,354.8
Western Hemlock / Blueberry	3,212.4
Alpine Lichen - Rock Outcrop	2,609.1
Glaciers	2,214.2
Tufted Club Rush / Bog Kalmia	1,645.9
Mixed Conifer / Blueberry / Deer Cabbage	1,484.5
Mixed Conifer / Blueberry / Skunk Cabbage	1,432.7
Western Hemlock / Blueberry - Devil's Club - shallow soils	1,265.8
Western Hemlock / Blueberry - Devil's Club	1,177.0
Mountain Hemlock / Blueberry - Mertens Cassiope	1,002.7
Mixed Conifer / Blueberry	948.8
Western Hemlock / Blueberry / Spinulose Shield Fern	926.3
Emergent Tall Sedge Muskeg	727.7
Western Hemlock / Blueberry / Skunk Cabbage	500.2
Emergent Mixed Forb / Grassland	483.8
Western Hemlock - Alaska Cedar / Blueberry	448.9
Sitka Spruce / Blueberry	337.2
Mixed Conifer / Copperbush	195.8
Sitka Spruce / Blueberry / Devil's Club	149.6
Bluejoint / Mixed Forb	127.5
Alkali Grass - Sand-spurry	95.6
Sitka Grass / Alder	77.9
Silverweed / Hairgrass / Lyca	63.7
Sitka Spruce / Devil's Club	5.9

Table H-10. Forest Plant Associations By Soil Type

Soil Map Unit	Forest Plant Associations	Percent Composition
53M	Alder - Salmonberry	35
	Emergent Tall Sedge Muskeg	30
	Emergent Mixed Forb / Grassland	20
53Y	Sitka Spruce / Blueberry - Devil's Club	35
	Sitka Spruce / Blueberry	35
	Sitka Spruce / Alder	20
61T	Tuft Club Rush / Bog Kalmia	45
	Mixed Conifer / Blueberry / Skunk Cabbage	35
	Mixed Conifer / Blueberry / Deer Cabbage	20
62M	Tuft Club Rush / Bog Kalmia	90
62T	Tuft Club Rush / Bog Kalmia	40
	Mixed Conifer / Blueberry / Skunk Cabbage	35
	Mixed Conifer / Blueberry / Deer Cabbage	20
63P	Tuft Club Rush / Bog Kalmia	45
	Mixed Conifer / Blueberry / Deer Cabbage	25
	Mixed Conifer / Blueberry	20
63T	Tuft Club Rush / Bog Kalmia	40
	Mixed Conifer / Blueberry / Skunk Cabbage	35
	Mixed Conifer / Blueberry / Deer Cabbage	20
71	Alkali Grass - Sand-spurry	30
	Silverweed / Hairgrass / Lyca	20
	Bluejoint / Mixed Forb	40
74E	Sitka Spruce / Blueberry - Devil's Club	45
	Sitka Spruce / Blueberry	20
	Sitka Spruce / Devil's Club	20
44KD	Western Hemlock / Blueberry	35
	Western Hemlock / Blueberry - Devil's Club - Shallow Soils	20
	Mixed Conifer / Blueberry / Skunk Cabbage	20
44ND	Western Hemlock / Blueberry	35
	Western Hemlock - Alaska Cedar / Blueberry	35
	Mixed Conifer / Blueberry	10
44NE	Western Hemlock / Blueberry	35
	Western Hemlock - Alaska Cedar / Blueberry	35
	Mixed Conifer / Blueberry	10
44PC	Mixed Conifer / Blueberry / Deer Cabbage	35
	Mixed Conifer / Blueberry	20
	Mixed Conifer / Copperbush	20
51J	Western Hemlock / Blueberry - Devil's Club	35
	Western Hemlock / Blueberry / Spinulose Shield Fern	25
	Sitka Spruce / Blueberry	20
51K	Western Hemlock / Blueberry	60
	Western Hemlock / Blueberry / Skunk Cabbage	30
52J	Western Hemlock / Blueberry - Devil's Club	35
	Western Hemlock / Blueberry / Spinulose Shield Fern	25
	Sitka Spruce / Blueberry	20
52T	Tuft Club Rush / Bog Kalmia	40
	Mixed Conifer / Blueberry / Skunk Cabbage	35
	Mixed Conifer / Blueberry / Deer Cabbage	20
52Y	Sitka Spruce / Blueberry - Devil's Club	35
	Sitka Spruce / Blueberry	35
	Sitka Spruce / Alder	20
36SD	Western Hemlock / Blueberry	75
37	Alder - Salmonberry	35
	Western Hemlock / Blueberry - Devil's Club - Shallow Soils	15
42KC	Western Hemlock / Blueberry	40
	Western Hemlock / Blueberry - Devil's Club - Shallow Soils	20
	Mixed Conifer / Blueberry	15
42KD	Western Hemlock / Blueberry	35
	Western Hemlock / Blueberry - Devil's Club - Shallow Soils	20
	Western Hemlock / Blueberry / Skunk Cabbage	20
42P	Mixed Conifer / Blueberry / Deer Cabbage	30
	Mixed Conifer / Blueberry	25
	Mixed Conifer / Blueberry / Skunk Cabbage	20

Table H-10. Forest Plant Associations By Soil Type (continued)

Soil Map Unit	Forest Plant Associations	Percent Composition
42T	Mixed Conifer / Blueberry / Deer Cabbage	45
	Moss Muskeg	30
	Mixed Conifer / Blueberry / Skunk Cabbage	20
44JC	Western Hemlock / Blueberry / Spinulose Shield Fern	35
	Western Hemlock / Blueberry - Devil's Club	25
	Western Hemlock / Blueberry	20
44JE	Western Hemlock / Blueberry / Spinulose Shield Fern	35
	Western Hemlock / Blueberry	25
	Western Hemlock / Blueberry - Devil's Club	20
44KC	Western Hemlock / Blueberry	40
	Western Hemlock / Blueberry - Devil's Club - Shallow Soils	20
	Mixed Conifer / Blueberry	15
32SD	Western Hemlock / Blueberry	75
32SE	Western Hemlock / Blueberry	75
35JD	Western Hemlock / Blueberry / Spinulose Shield Fern	35
	Western Hemlock / Blueberry	25
	Western Hemlock / Blueberry - Devil's Club	20
35KD	Western Hemlock / Blueberry	35
	Western Hemlock / Blueberry - Devil's Club - Shallow Soils	20
	Western Hemlock / Blueberry / Skunk Cabbage	20
35ND	Western Hemlock / Blueberry	35
	Western Hemlock - Alaska Cedar / Blueberry	35
	Mixed Conifer / Blueberry	10
35NE	Western Hemlock / Blueberry	35
	Western Hemlock - Alaska Cedar / Blueberry	35
	Mixed Conifer / Blueberry	10
35SD	Western Hemlock / Blueberry	75
36KD	Western Hemlock / Blueberry	35
	Western Hemlock / Blueberry - Devil's Club - Shallow Soils	20
	Western Hemlock / Blueberry / Skunk Cabbage	20
36ND	Western Hemlock / Blueberry	35
	Western Hemlock - Alaska Cedar / Blueberry	35
	Mixed Conifer / Blueberry	10
36PC	Mixed Conifer / Blueberry / Deer Cabbage	35
	Mixed Conifer / Blueberry	20
	Mixed Conifer / Copperbush	20
11	Alpine Lichen - Rock Outcrop	85
	Alpine Shrubland / Emergent Muskeg	15
12A	Alpine Shrubland / Emergent Muskeg	90
	Alpine Lichen - Rock Outcrop	10
12S	Mountain Hemlock / Mertens Cassiope	60
	Alpine Shrubland / Emergent Muskeg	20
13	Glaciers, Unvegetated	100
21	Alder - Salmonberry	80
	Western Hemlock / Blueberry - Devil's Club	10
	Western Hemlock / Blueberry - Devil's Club - Shallow Soils	10
32JC	Western Hemlock / Blueberry / Spinulose Shield Fern	30
	Western Hemlock / Blueberry - Devil's Club	25
	Western Hemlock / Blueberry	20
32JD	Western Hemlock / Blueberry / Spinulose Shield Fern	35
	Western Hemlock / Blueberry	25
	Western Hemlock / Blueberry - Devil's Club	20
32JE	Western Hemlock / Blueberry / Spinulose Shield Fern	35
	Western Hemlock / Blueberry	25
	Western Hemlock / Blueberry - Devil's Club	20
32ND	Western Hemlock / Blueberry	35
	Western Hemlock - Alaska Cedar / Blueberry	35
	Mixed Conifer / Blueberry	10

Source: ACZ, 1991b.

Table H-11. Kensington Wetlands Functions and Values

Plant Association	Ground Water		Surface Hydrologic Control		Bank or Shoreline Sensitivity	Sediment Retention		Nutrient Removal & Transformation		Salmonid Habitat	Wildlife Diversity	Riparian Support	Downslope Beneficiary Sites
	Recharge	Discharge	Opportunity	Effectiveness		Opportunity	Effectiveness	Opportunity	Effectiveness				
Tufted Club Rush	Moderate-C	Moderate-C	High-C	High-C		Low-B	High-A	High-B	High-A		Moderate-C	Moderate	Low
Mixed Conifer / Blueberry / Skunk Cabbage	Low-C	Low-C	High-C	High-C		High-A	Moderate-C	High-B	High-A		Moderate-C	Moderate	High
Mixed Conifer / Blueberry / Deer Cabbage	Moderate-C	Moderate-C	Moderate-C	Moderate-C		Low-A	Low-B	Low-A	High-A		Moderate-C	Moderate	Low
Western Hemlock / Blueberry	Low-B	High-B	Moderate-C	Moderate-C		Moderate-A	Low-A	High-B	High-A		Moderate-C	High	Low
Western Hemlock / Blueberry / Skunk Cabbage	Moderate-C	Low-C	High-C	Low-C		Moderate-A	Low-C	Low-A	High-A		Moderate-C	Moderate	Low
Mixed Conifer / Blueberry	Moderate-C	Moderate-C	High-C	Moderate-C		Low-A	Low-A	Low-A	High-A		Moderate-C	Moderate	Low
Western Hemlock / Blueberry -Devil's Club - Shallow Soils	Low-C	High-C	High-C	Low-C		Low-A	Low-A	Low-A	High-A		Moderate-C	Moderate	High
Bluejoint / Mixed Forb	Low-C	Moderate-C	High-C	High-C		Low-B	High-A	Low-A	High-A		Moderete-C	Moderate	Low
Alkali Grass / Sand-spurry	Low-C	Moderate-C	High-C	High-C		Low-B	High-A	Low-A	High-A		Moderate-C	Moderete	Low
Silverweed / Hairgress / Lyca	Low-C	Moderate-C	High-C	High-C		Low-B	High-A	Low-A	High-A		Moderate-C	Moderete	Low
AQUATIC SITES													
Sherman Creek Below Fells	Low-C	Moderate-C	High-C	High-C	Moderete-A	High-A	High-C	Low-A	High-A	Moderate-C	High-A	Moderete	High
Lower Ophir Creek	Moderate-C	Moderate-C	High-C	Low-C	Low-A	High-A	High-C	Low-A	High-A	High-C	Moderate-C	Moderate	Low
Upper Shermen Creek	Moderete-C	Low-B	High-C	High-C	Moderete-A	Low-A	High-B	Moderate-B	High-A	High-C	High-C	High	Low
Comet Beach	Low-A	Low-C	High-C	Low-A	Moderate-A	Moderate-C	Low-C	High-B	High-A	Moderete-C	Moderate-C	High	High
Sweeny Creek	Moderete-C	Moderete-C	High-C	Moderete-C	Moderate-A	Moderate-A	Low-A	Low-A	Moderete-C	High-B	High-C	Moderete	High

A, B, AND C designetions Indicate levels of certeinty es per Adamus Resource Assessment, Inc. (1987).

Glaciers

This type is characterized as unvegetated ice and is included as a miscellaneous habitat type. This type covers 2,214.2 acres or 6.4 percent of the study area. The major influence of this type on vegetation relates to the moisture supply aspects.

Tufted Club Rush Bog Kalmia

This nonforested plant association covers 1,645.9 acres or 4.7 percent of the study area on muskeg sites with undulating surfaces (mounds and hollows) on eight different soil mapping units. The dominate vegetation on these sites is tufted club rush (*Scripus caespitosus*) and other sedges in the herbaceous layer. A mixture of low shrubs, including bog laurel or kalmia, crowberry, bog and dwarf blueberry (*Vaccinium uliginosum* and *V. groenlandicum*) occur in this type. Standing water is rarely present, but the water table is often near the surface. These areas are considered wetlands.

Mixed Conifer / Blueberry / Deer Cabbage

This forested plant association covers 1,484.5 acres or 4.3 percent of the study area and is found on 9 different soil mapping units. The overstory is typically dominated by Alaska (yellow) cedar with Sitka spruce and lodgepole pine as codominant. Canopy cover ranges from 25 to 30 percent. The understory consists of a mixture of muskeg and forest plants, and this type supports the greatest vegetation diversity of any association below the alpine zone. The dominant shrubs include blueberry, rusty menziesia, and crowberry. The herb layer is dominated by deer cabbage, bunchberry. and fern leaf goldthread. This type occurs at low elevations below the subalpine zone on nearly level sites. These sites are considered wetlands.

Mixed Conifer / Blueberry / Skunk Cabbage

This forested plant association covers 1,432.7 acres or 4.1 percent of the study area and is found on 6 different soil mapping units. The overstory of this type is dominated by a mixture of western and mountain hemlock. Canopy cover ranges from 40 to 50 percent. The shrub layer is dominated by blueberry and rusty menziesia and averages 80 percent cover. The herb layer is dominated by skunk cabbage and bunchberry and fern leaf goldthread also are common. This type occurs at all elevations below the subalpine zone on nearly level sites.

Wester Hemlock / Blueberry - Devil's Club Shallow Soils

This forested plant association covers 1,265.8 acres or 3.6 percent of the study area and is found on nine different soil mapping units. The overstory is dominated by large western hemlock with minor amounts of Sitka spruce. The tree canopy cover ranges from 65 to 75 percent. Devil's club and blueberry dominate the shrub layer while the herb layer is dominated

by oak fern and various other low growing forbs. This type occurs on mid to low elevation side and foot slopes on areas that are moderately influenced by alluvial or groundwater disturbances.

Western Hemlock / Blueberry - Devil's Club

This forested plant association covers 1,177 acres or 3.4 percent of the study area and is found on nine different soil mapping units. The overstory is dominated by medium sized western hemlock with some Sitka spruce. The canopy cover ranges from 55 to 65 percent. Devil's club and blueberry dominate the shrub layer while the herb layer is dominated by small low growing forbs such as bunchberry, five leaf bramble and foam flower (*Tiarella tritoliata*). This type is found primarily on steep mountain slopes at ail elevations below the subalpine zone. This type is considered upland.

Mountain Hemlock / Blueberry / Mertens Cassiope

This forested plant association covers 1,002.7 acres or 2.9 percent of the study area and is found only on soil mapping unit 12S. The overstory of this type is dominated by mountain hemlock and the canopy cover ranges from 20 to 30 percent. The shrub layer is dominated by a mixture of low to medium sized shrubs including mertens cassiope (*Cassiope mertensiana*), starry Cassiope (*Cassiope sfelleriana*), yellow mountain heather, luetka (*Luetka pectinata*), blueberry, rusty menziesia and copperbush. The herbaceous layer is dominated by deer cabbage. Bunchberry, five leaf bramble, and fern leaf goldthread also are common. This type occurs at high elevation sites that are transitional to the alpine tundra zone.

Mixed Conifer / Blueberry

This forested plant association covers 948.8 acres or 2.8 percent of the study area and is found on 12 different soil mapping units. This type has an overstory dominated by western and mountain hemlock. Canopy cover ranges from 35 to 45 percent. Blueberry and rusty menziesia are the most common shrubs while deer fern, bunchberry, five-leaf bramble and fern leaf goldthread are the most common herbs. Shrub cover averages 90 percent while herb cover averages 45 percent. This habitat type occurs on hill tops, knobs, and mid slope benches at low elevation sites below the subalpine zone.

Western Hemlock / Blueberry / Spinulose Shield Fern

This forested plant association covers 926.3 acres or 2.7 percent of the study area and is found on 8 different soil mapping units. This type is dominated by large eastern hemlock with canopy cover values ranging from 70 to 75 percent. Blueberry dominates the shrub layer, and the average shrub cover is 65 percent. Bunchberry and five-leaf bramble dominate the herbaceous layer, and the average cover of all herbs is 35 percent. These sites occur on stable mountain and foot slope intervals. This type is the most productive of the hemlock series.

Emergent Tall Sedge Musket

This nonforested plant association covers 725.7 acres or 2.1 percent of the study area and is found only on soil mapping unit 53M. These sites are dominated by tall sedges, but short sedges also are abundant. These areas are typically very wet and are considered wetlands.

Western Hemlock / Blueberry / Skunk Cabbage

This forested plant association covers 500.2 acres or 1.4 percent of the study area and is found on 5 different soil mapping units. This site is characterized by medium sized western hemlock in the overstory which ranges from 55 to 65 percent. Dominant shrubs are blueberry and rusty menziesia, and shrub cover averages 65 percent. Skunk cabbage and five leaf bramble dominate the herbaceous layer. This type occurs on slopes generally less than 30 percent at all elevations below the subalpine zone. Sites on foot slopes, benches, and lowlands are often characterized by a high water table. These sites have a characteristic appearance of mounds and depressions with trees and blueberry rooted on the mounds and skunk cabbage in the depressions. This association occurs on wetland, and mixed wetland, and upland areas.

Emergent Mixed Forb / Grassland

This nonforested plant community occurs on 483.8 acres or 1.4 percent of the study area and is found only on soil mapping unit 53M along the Berners River. No description of this habitat type could be found; however, it appears to be similar to most muskeg areas and probably is dominated largely by various forbs and sedges. All of these areas are considered wetlands.

Western Hemlock - Alaska Cedar / Blueberry

This forested plant community occurs on 448.9 acres or 1.3 percent of the study area and is found on six different soil mapping units. Both western hemlock and yellow cedar dominate the overstory which ranges in canopy cover from 60 to 70 percent. Blueberry and rusty menziesia are the dominant shrubs with an average cover value of 85 percent. Oak fern, deer fern, bunchberry, five-leaf bramble, and five leaf goldthread dominate the herbaceous layer. These sites are commonly found on slopes where drainage or rooting are impeded at elevations below the subalpine zone. This association occurs on wetland, mixed wetland, and upland areas.

Sitka Spruce / Blueberry

This forested plant community occurs on 337.2 acres or 1.0 percent of the study area and is found on five different soils mapping units. This type is characterized by large Sitka spruce as the dominant overstory species. Canopy cover ranges from 75 to 90 percent. The shrub layer is dominated by blueberry and averages 40 percent cover. Foam flower, twisted stalk and oak fern dominate the herbaceous layer which averages 35 percent cover. This type usually occurs on uplifted benches, on intervals on alluvial fans, and frequently dissected foot slopes. These sites are considered upland.

APPENDIX I

WETLAND INDICATOR STATUS

This appendix was taken from the following document: IME, Incorporated. 1991. *Jurisdictional Wetland Determination for the Kensington Venture Gold Mine Project, Alaska.* Prepared for U.S. Forest Service, Tongass National Forest.

I. WETLAND INDICATOR STATUS

Scientific Name	Common Name	Status
Grasses and Forbs		
Achillea millefolium	Common Yarrow	FACU
Aconitum delphinifolium	Monkshood	FAC
Actaea rubra	Baneberry	UPL
Adiantum pedatum	Maiden-Hair Fern	FAC
Agrostis spp.	Bentgrass	FACW
Arnica cordifolia	Heart-Leaf Arnica	UPL
Arnica diversifolia	Sticky-Leaf Arnica	FACW
Aruncus sylvester	Goatsbeard	UPL
Athyrium filix-femina	Subarctic Lady Fern	FAC
Blechnum spicant	Deer Fern	FAC
Calamagrostis canadensis	Bluejoint Reedgrass	FAC
Calamagrostis leptosepala	Slender Marsh Marigold	OBL
Calamagrostis nutkaensis	Pacific Small Reedgrass	FAC
Carex anthoxanthea	Grassy-Slope Arctic Sedge	FACW
Carex bigelowii	Bigelow's Sedge	FAC
Carex lenticularis	Shore Sedge	OBL
Carex macrochaeta	Long-Awn Sedge	FACW
Carex mertensii	Merten's Sedge	FACW
Carex nigricans	Black Alpine Sedge	FACW
Carex pauciflora	Few-Flower Sedge	OBL
Carex pluriflora	Several-Flowered Sedge	OBL
Carex sitchensis	Sitka Sedge	OBL
Castilleja parviflora	Small Indian Paintbrush	FACW
Castilleja unalaschcensis	Alaska Indian Paintbrush	FAC
Cerastium spp.	Chickweed	FACW
Circaea alpinum	Enchanter's Nightshade	FACW
Claytonia sibirica	Siberian Springbeauty	FACW
Claytonia uniflora	Bluebead	UPL
Cornus canadensis	Canada Bunchberry	FACU
Corallhorrhiza mertensiana	Merten's Coralroot	UPL
Cornus suecica	Swedish Dwarf Dogwood	FAC
Coptis trifolia	Alaska Goldthread	FAC
Coptis aspleniifolla	Spleenwortleaf Goldthread	FAC
Cystopteris fragilis	Brittle Fern	FACU
Cystopteris montana	Mountain Bladder Fern	FAC
Delphinium glaucum	Tower Larkspur	FACW
Deschampsia cespitosa	Tufted Hairgrass	FAC

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Grasses and Forbs (cont.)		
Dodecatheon spp.	Shooting-Star	FACW
Drosera rotundifolia	Round-Leaf Sundew	OBL
Dryopteris austriaca	Shield Fern	FACU
Dryopteris fragrans	Fragrant Shield-Fern	UPL
Elymus mollis	Dunegrass	UPL
Epilobium spp.	Willow-Herb	FACW
Epilobium alpinum	Willow-Herb	NI
Epilobium angustifolium	Fireweed	FACU
Epilobium glandulosum	Willow-Herb	NI
Epilobium latifolium	River Beauty	FAC
Equisetum arvense	Field Horsetail	FACU
Equisetum hyernale	Rough Horsetail	FACW
Equisetum pratense	Meadow Horsetail	FACW
Erigeron acris	Bitter Fleabane	FAC
Erigeron peregrinus	Wandering Fleabane	FACW
Eriophorum angustifolium	Narrow-Leaf Cottongrass	OBL
Eriophorum spp.	Cottongrass	OBL
Fauria crista-galli	Deer Cabbage	FACW
Festuca rubra	Red Fescue	FAC
Fritillaria camschatcensis	Chocolate Lily	FAC
Galium aparine	Catchweed Bedstraw	FACU
Galium kamschaticum	Northern Wild-Licorice	UPL
Galium trifidum	Small Bedstraw	FACW
Galium triflorum	Sweetscent Bedstraw	FACU
Gentiana douglasiana	Swamp Gentian	FACW
Gentiana platypetala	None	UPL
Geum calthifolium	Caltha-Leaf Avens	FACW
Geranium erianthum	Meadow Crane's Bill	FAC
Gymnocarpium dryopteris	Oak Fern	FACU
Heracleum lanatum	Cow Parsnip	FACU
Heuchera glabra	Alpine Heuchera	UPL
Hieracium gracile	Slender Hawkweed	UPL
Hippuris montana	Mountain Mare's-Tail	OBL
Hypopitys monotropa	Pinesap	UPL
Iris setosa	Beech-Head Iris	FAC
Juncus spp.	Rush	OBL
Kruhsea streptopoides	Kruhsea	UPL
Lathyrus japonicus	Beach Peavine	FAC
Leptarrhena pyrolifolia	Leather-Leaf Saxifrage	FACW
Linnaea borealis	Twin-Flower	UPL
Listera caurina	Western Twayblade	FACU

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Listera cordata	Heart-Leaf Twayblade	FACU
Lupinus nootkatensis	Nootka Lupine	FAC
Luzula campestris	Hairy Woodrush	FAC
Luzula parviflora	Small-Flower Woodrush	FAC
Lycopodium spp.	Clubmoss	FACU
Lycopodium annotinum	Stiff Clubmoss	FAC
Lycopodium clavatum	Running Clubmoss	UPL
Lycopodium selago	Fir Clubmoss	UPL
Lysichiton americanum	Yellow Skunk Cabbage	OBL
Maianthemum dilatatum	Deer Cabbage	NI
Malaxis spp.	Adder's Mouth	OBL
Mitella spp.	Bishop's Cap	FAC
Montia spp.	Miner's-Lettuce	OBL
Osmorhiza chilensis	Chile Sweet-Cicely	UPL
Osmorhiza purpurea	Purple Sweet-Cicely	FACU
Parnassia fimbriata	Fringed Parnassus' Grass	FACW
Petasites frigidus	Arctic Sweet Coltsfoot	FACW
Phleum alpinum	Alpine Timothy	FACU
Pinguicula vulgaris	Common Butterwort	OBL
Platanthera chorisiana	Choriso Bog Orchid	OBL
Platanthera hyperborea	Northern Bog Orchid	FACW
Poa spp.	Bluegrass	FAC
Poa palustris	Fowl Bluegrass	FAC
Poa stenantha	Northern Bluegrass	FAC
Polypodium glycyrrhiza	Licorice Fern	UPL
Polystichum spp.	Holly-Fern	UPL
Polystichum braunii	Prickly-Shield Fern	UPL
Polystichum lonchitis	Holly-Fern	UPL
Polystichum setigerum	None	UPL
Potentilla anserina	Silverweed	FACW
Prenanthes alata	Rattlesnake	UPL
Pteridium aquillnum	Bracken Fern	FACU
Pyrola secunda	One-Sided Wintergreen	FACW
Ranunculus spp.	Buttercup	FACW
Ranunculus occidentalis	Western Buttercup	UPL
Ranunculus uncinatus	Hooked Buttercup	FACW
Rubus chamaemorus	Cloudberry	FACW
Rubus pedatus	Strawberry-Leaf Raspberry	FAC
Sanguisorba canadensis	Canada Burnet	FACW
Saxifraga ferruginea	Rusty-Hair Saxifrage	FAC

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Scirpus cespitosus	Tufted Bulrush	OBL
Selaginella selaginoides	Club Spikemoss	FACU
Senecio triangularis	Arrow Leaf Groundsel	FACW
Stellaria crispa	Crisp Starwort	FAC
Stellaria spp.	Starwort	FAC
Streptopus amplexifolius	Clasp-Leaf Twisted Stalk	FAC
Streptopus spp.	Twisted Stalk	FACU
Streptopus roseus	Rosy Twisted Stalk	FACU
Synthyris borealis	Kittentails	UPL
Taraxacum officinale	Common Dandelion	FACU
Thelypteris limbosperma	Mountain Wood Fern	UPL
Thelypteris phegopteris	Northern Beech Fern	UPL
Tiarella trifoliata	Trifoliate Foamflower	FAC
Tiarella unifoliata	Unifoliate Foamflower	UPL
Tofieldia glutinosa	Sticky Tofieldia	FACW
Trientalis europea	Arctic Starflower	FAC
Triglochin maritimum	Seaside Arrowgrass	OBL
Trisetum spp.	Oatgrass	NI
Valeriana sitchensis	Sitka Valerian	FAC
Veratrum viride	American False-Hellebore	FACU
Viola glabella	Smooth Yellow Violet	FACW
Shrubs		
Alnus crispa	Green Alder	FAC
Alnus sinuata	Sitka Alder	FAC
Andromeda polifolia	Bog Rosemary	OBL
Cassiope mertensiana	Merten's Cassiope	UPL
Cassiope stelleriana	Starry Cassiope	UPL
Empetrum nigrum	Black Crowberry	FAC
Kalmia polifolia	Pale Laurel	FACW
Ledum decumbens	Narrowleaf Labrador Tea	FACW
Ledum groenlandicum	Greenland Labrador Tea	FACW
Luetkea pectinata	Lutkea	UPL
Malus fusca	Pacific Crabapple	FACU
Menziesia ferruginea	Rusty Menziesia	UPL
Oplopanax horridus	Devil's Club	FACU
Phyllodoce glanduliflora	Yellow Mountain Heather	UPL
Ribes bracteosum	Stink Currant	NI
Ribes spp.	Currant	FAC
Rubus idaeus	Common Red Raspberry	FAC
Rubus spectabilis	Salmon Berry	FACU

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Shrubs (cont'd)		
Rubus stellatus	Nagoon Berry	FAC
Salix sitchensis	Sitka Willow	FAC
Salix spp.	Willow	FAC
Sambucus racemosa	European Red Elder	FACU
Sorbus scopulina	Greene's Mountain Ash	NI
Vaccinium alaskaense	Alaska Blueberry	FAC
Vaccinium cespitosum	Dwarf Blueberry	FACW
Vaccinium groenlandicum	Bog Blueberry	UPL
Vaccinium ovalifolium	Early Blueberry	FAC
Vaccinium oxycoccos	Small Cranberry	OBL
Vaccinium parviflorum	Red Huckleberry	UPL
Vaccinium uglinosum	Bog Blueberry	FAC
Vaccinium vitis-idaea	Mountain Cranberry	FAC
Viburnum edule	Squashberry	FACU
Trees		
Alnus rubra	Red Alder	FAC
Betula occidentalis	Spring Birch	FAC
Betula papyrifera	Paper Birch	FACU
Chamaecyparis nootkatensis	Alaska Cedar	FAC
Picea sitchensis	Sitka Spruce	FACU
Pinus contorta	Lodge-Pole Pine	FAC
Populus balsamifera	Balsam Poplar	FACU
Sorbus sitchensis	Sitka Mountain Ash	UPL
Tsuga heterophylla	Western Hemlock	FAC
Tsuga mertensiana	Mountain Hemlock	FAC

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